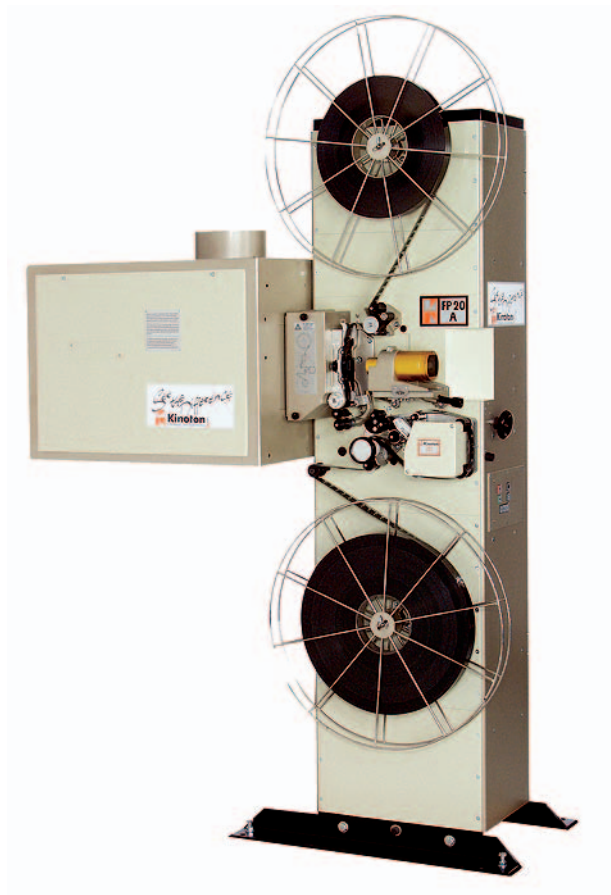


Operating Manual

FP 20 A Projector



DIGITAL CINEMA
FILM TECHNOLOGY
STUDIO TECHNOLOGY
CUSTOMIZED SOLUTIONS
360° DISPLAY SYSTEMS

Preface

Dear customer,

this operating manual will help you get acquainted with the projector and to make use of its possible applications in accordance with the requirements.

This operating manual includes important hints for a safe, proper, correct and economic operation.

It will also help you to avoid danger, to reduce failures and to increase life and reliability of the projector.

This operating manual includes useful hints for proprietor and personnel obligations. It does not substitute, but supports, a thorough training period.

We confirm that the information given in this manual is true and correct to the best of our knowledge and belief. However, notwithstanding all best care and attention, technical inaccuracies and typographical errors cannot be fully excluded.

As far as we did not assure explicitly and written form any special characteristics and suitability of a product for a certain intended purpose, the statement in this manual are generally without obligation.

All descriptions, illustrations and technical data comply with the technical status of the product at the date of printing of this manual. Any modifications are subject to change without prior notice due to ongoing further development.

Imprint

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Hints / Own Notes

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1 Safety

1.1 Safety Notes

1.1.1 General Hints

- » Read this operating manual before operating the projector.
- » This operating manual is to be kept with the projector at all times.
- » For safe and trouble free operation of the projector a good working knowledge of basic safety regulations and the projector's correct use is required.
- » This operating manual contains the most important instructions for running the projector safely.
- » This operating manual must be read and understood by all persons working with the projector, with particular emphasis on all aspects regarding safety.
- » In addition, all valid regulations and measures concerning accident prevention must be observed.
- » The owner is responsible to assure that all persons who work with and / or operate the projector are familiar with safe operating practices and accident prevention techniques and have a complete working knowledge of the projector and all additional machines and components of the system.
- » Those persons who work with the projector are responsible:
 - to observe safe operating practices and accident prevention techniques
 - to have read and fully understand the safety chapter and the warnings within this operating manual.
- » The place on which the projector will be installed must be even, solid and clean.
- » Installation and basic adjustment must always be carried out by trained service personnel.

1.1.2 Dangers when Working with the Projector

Projectors are constructed according to the latest engineering and state-of-the art safety standards. The projector is only to be used for its intended purpose and is only used when functioning absolutely perfectly.

Serious danger may result from improper use of the projector, causing injury to the user or a third person, or damage may be done to the projector or other items in the vicinity.

Faults that could adversely affect safety must be rectified immediately.

The projector must not be used until any faults are rectified.

1.1.3 Intended Purpose

The projector is suitable to reproduce 35 mm film images and sound.

Any other or further use is not classified as an “intended purpose”. KINOTON cannot be held liable for any damage resulting from different or extended operation.

As part of the “intended purpose” these tasks must be performed:

- » Observing all instructions and warnings contained in this manual
- » Inspecting the equipment for damage and correct function
- » Implementation of maintenance and repair work.

1.1.4 Guarantee and Liability

By reference KINOTON’s “General Terms of Business” apply. They are available to the customer on conclusion of sale at the latest.

Guarantee and liability claims for damage to persons and property are invalid if due to one of the following causes:

- » Improper use of the projector
- » Improper assembly, commissioning, operating and maintenance of the projector
- » Operation the projector with defective and / or non-functioning safety and protection devices
- » Activating the lamphouse via the rectifier and not via the projector
- » Disregarding of the instructions in the manual concerning transportation, storage, assembly, commissioning, operation and maintenance
- » Modification of the projector without written authorisation from the manufacturer
- » Connecting to power other than as specified
- » Failure to monitor and/or replace parts subject to wear and tear
- » Improper repairs
- » Emergencies due to influence from outside bodies or force majeure.

1.2 Explanations of Symbols and Notes

Throughout this manual you will find the following symbols:



DANGER

This symbol indicates an imminent threat of danger to life and personal health. Disregarding this warning can result in serious personal injuries or highly dangerous injuries.



WARNING UV RADIATION

This symbol warns from UV radiation and that eye and skin protection during installation and servicing must be put on.



ATTENTION

This symbol indicates a possibly dangerous situation. Disregarding this warning can result in small personal injuries or damage to projector.



NOTE

This symbol indicates where notes, user tips and useful information can be found. They serve to help use the projector to its fullest.



Always wear **face protection** when changing the xenon lamp.



Always wear **protection gloves** when changing the xenon lamp.



Always wear **protection jacket (Kevlar)** when changing the xenon lamp.

1.3 Special Hazard Points

1.3.1 Electric Power Hazards



DANGER

- ▲ The access to power supply must always be kept closed. Only authorized service personnel may access this area.
- ▲ Installation according to the local electrical code and regulations and work on the electrical supply conductors or circuits must only be done by qualified technical personnel.
- ▲ This projector should be operated from an AC power source. Ensure that the mains voltage and capacity matches the projector electrical ratings. Do not defeat the purpose of the grounding.
- ▲ Do not allow anything to rest on the power cable and do not locate the projector where persons will walk on the cable.
- ▲ Do not operate the projector with a damaged cable or if the projector has been dropped or damaged - until it has been checked for operation by a qualified service technician.
- ▲ Position the cable so that it will not be tripped over, pulled, or contact hot surfaces.
- ▲ If an extension cable is necessary, a cable with a current rating at least equal to that of the projector should be used to avoid overheating of the cable.
- ▲ Do not use an accessory attachment which is not recommended by the manufacturer.
- ▲ The rectifier must be exclusively enabled from projector only.
- ▲ The 4060 DC ignition unit is directly supplied via the rectifier. Therefore the lamp can be ignited by switching on the rectifier itself. Igniting the lamp by switching on the rectifier at open lamphouse can cause serious injuries and damages to the lamphouse and projector.
- ▲ The safety devices in the lamphouse (door switches and air flow switch) must not be deactivated. Safe service work on open lamphouse is possible with functional safety devices only, because rectifier and mains power will be switched off.

1.3.2 Lamphouse Hazards

1.3.2.1 Broken Glass

In cold condition the xenon lamp has an inner pressure of about 8 to 10 bar (145 psi) and in hot condition of about 30 bar (435 psi). When a xenon lamp bursts, broken glass can cause suffer injury to face, eyes and arteries. Therefore it is absolutely necessary to wear protection with open lamphouse.



DANGER OF EXPLOSION

- ▲ Never bypass a door switch.
- ▲ Only work on open lamphouse and with xenon bulb with face protection (shield), neck protection and safety gloves which reach to the elbow.
If the xenon lamp explodes you can suffer injury to face, eyes and arteries.
- ▲ Dispose of the xenon bulb: Before removing xenon lamp put protective cover around it, pack xenon bulb in original package and give it back to your supplier.
- ▲ Only insert the new xenon bulb in protective cover. Remove cover after mounting the xenon bulb.

1.3.2.2 UV Radiation



WARNING UV RADIATION

- ▲ Operate projector with a closed lamphouse only.
- ▲ Use UV radiation eye and skin protection during adjustment of the lamp and convergence.
- ▲ If you do some adjustments with an open lamphouse (look through visual hole), you have to use visual protection which blocks the ultraviolet radiation.
Never look into light of a xenon lamp without protective glasses!

1.3.2.3 High Voltage



DANGER

Ignite xenon lamp in closed lamphouse only.

1.3.3 Mechanical Danger



DANGER

- ▲ Do not work around the machine with long loose hair, or loose clothing such as scarves or ties, they may get trapped in the drive mechanism and pull you in.
- ▲ Only open shutter housing when projector is standing still with power disconnected. If the projector is running with covers open be careful and do not touch the rotating shutter or other moving parts. Serious cuts can result.
- ▲ Do not put your fingers between the film track and film pressure skate or between sprockets and pad shoes.

1.4 Preventing Projector Damage



ATTENTION

- △ Always switch off main switch, before **cleaning** the projector housing. To keep the cabinet looking brand-new, periodically clean it with a soft cloth. Stubborn stains may be removed with a cloth lightly dampened with mild detergent solution. Never use strong solvents, such as thinner or benzine or abrasive cleaners, since these will damage the cabinet surface.
- △ To ensure the highest optical performance and resolution, the projector lenses are specially treated with an anti-reflective coating. Therefore, avoid touching the coated lens surface.
To remove dust on the lens, use a soft dry cloth (Cleaning set from Kinoton).
Do not use a damp cloth, detergent solutions or thinner.

1.5 Service



ATTENTION

- △ Do not attempt to **service** this projector yourself. Refer all projector servicing to a qualified Kinoton service center.
- △ When replacement parts are required, be sure the service technician has used **original replacement parts** or authorized replacement parts which have the same characteristics as the original parts. Unauthorized substitutions may result in degraded performance and reliability, fire, electric shock or others hazards. Unauthorized substitutions may void warranty.
- △ Upon completion of any service or repairs to this projector, ask the service technician to **perform safety checks** to determine that the projector is in proper operation condition.
- △ Xenon compact arc lamps are under high pressure. The lamp must be handled with great care. They may explode if dropped or mishandled. Whenever the protective cover is removed from the lamp, authorized protective clothing must be worn.

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1.6 Protective Devices

All existing safety devices must be checked regularly

1.6.1 Main Switch

In case of an emergency, you can switch off the projector using the main switch (under the projector door). Push the switch to position "0". The red lamp in the switch turns off.

1.6.2 IR Reflex Film Break Sensor

The film break sensor (arrow) switches off the projector when no film is passing the sensor (e. g. at a film break). In this case the projector will be stopped.



► NOTE

If your projector is equipped with an automation system the film break sensor can trigger a run of events.

1.6.3 Film Stripper



The film stripper (arrow) prevents film from winding around the sprocket after a film break or loss of a tape fixing has happened.

Film strippers are attached to all sprockets.

2 Transportation and Installation / Mounting

2.1 Transportation

Delivery by a forwarding agent, train, ship or aircraft

- » The projector is mounted (without lamp house and film reel) on a pallet and secured with screws.
- » With delivery to countries over-seas the projector secured on the pallet is packed in a wooden crate.
- » The accessories are packed into a box or into the wooden crate too.
- » Weight (gross): about 160 kg (352.73 lb)

Storage

If the projector is stored for a longer time:

- » Only store in dry rooms.
- » Choose a suitable protective cover or leave projector in the original cover.

► **NOTE**

Although most parts are delivered with a protective cover, you have to clean the projector and its components before the first start.

2.2 Delivery or Equipment Variations

- » Projector FP 20 A
- » Lamphouse
 - up to 2000 W
 - up to 7000 W
- » Reverse-scan sound device
 - only analog, not upgradeable to Dolby Digital
 - optical stereo analog, upgradeable to Dolby Digital
 - optical stereo analog and Dolby Digital (option)
- » Lens holder
- » Lens turret (option)
 - 2 lenses and manual lens change
 - 2 lenses and automatic lens and aperture change
 - 3 lenses and manual lens change
 - 3 lenses automatic lens and aperture change
- » Automation system (option)
 - DMP 1 Digital Matrix Programmer
 - CCA3 Cue Code Automation
 - SA2 Sequence Cinema Automation
 - EMK 1 Electronic Automation System

- » Film gate cooling unit (option)
- » Water cooling system (from 4000 W lamp capacity on)
- » Roller set for using with a rewind system (option)
- » Pedestals
- » Film cleaner (option)
- » Operating manuals

2.3 Installation



ATTENTION

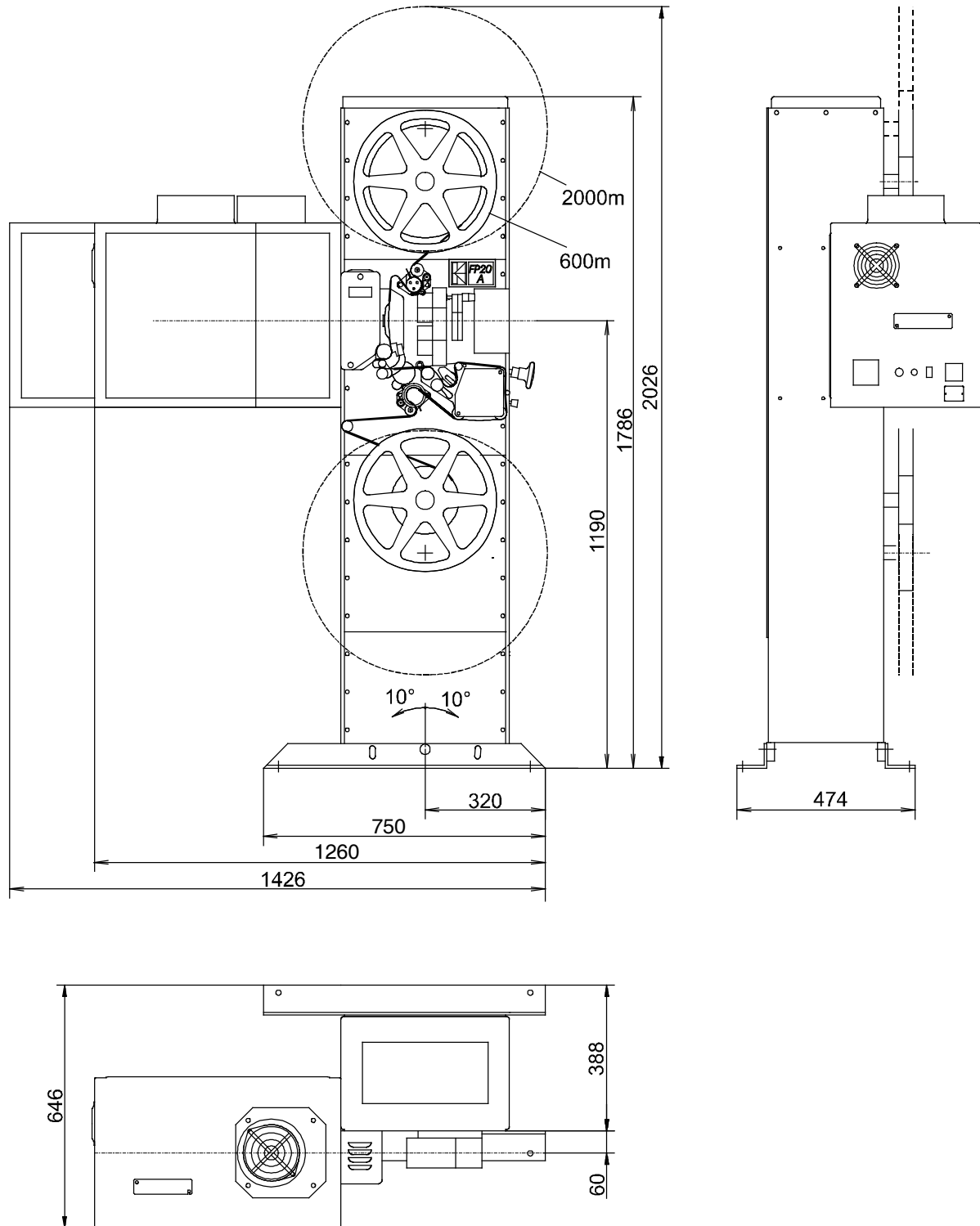
- △ The projector will be delivered completely wired and factory tested.
- △ Only use suitable hoisting machines (crane, fork-lift).
- △ Do not use unit parts as climbing aid.
- △ The electrical connections have to be in accordance with local regulations and be installed professionally.
- △ All installation should only be carried out by Kinoton service.

2.3.1 Place of Installation, Place of Operation

- » The place on which the unit will be installed must be even, solid and clean.
- » The figure on the next page shows the projector's dimensions.
- » Requirements of the projection room:
 - humidity: 40 to 60 %
 - temperature: 15 to 25° C
 - maximum sea level: 2000 m

2.3.2 Important Hints for Installation

Projector Dimensions



2.3.3 Additional Installation Hints



ATTENTION

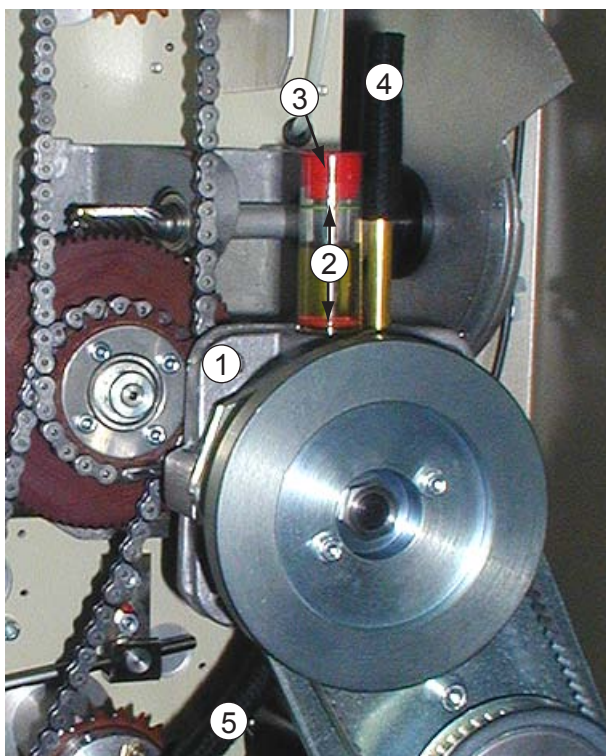
- △ The 16² PE lines have to be high-flexible to derive the high-frequency ignition voltage.
- △ Do not use the wires in the lamphouse cable to connect the additional dowser. Lay the dowser connection in the lamphouse tube as short as possible.
- △ If you install an old building projector remove all not used old cables, wires and lines under the projector.
- △ If possible the heat exchanger must not have more than 10 m distance to the projector and the refrigerating set must not have more than 15 m distance to the heat exchanger. If the environment temperature is high and the wires are long, the hose is to be isolated because of condensation.
- △ The cooling water temperature has to be more than 15° C, to avoid a precipitation of condensed water on the film gate and the front gate.

2.4 Mounting

2.4.1 Filling the Intermittent Movement with Oil

► **NOTE**

Use only Kinoton type 3672 oil.



- ① Intermittent movement (Maltese cross)
- ② Oil gauge glass with oil level rings (red and green)
- ③ Oil gauge cap
- ④ Vent hose
- ⑤ Waste oil hose

Procedure to fill with oil

- Open the projector head housing.
- Remove the oil gauge cap ③. If there is not a small vent hole in the cap, pierce it with a pin.
- Add oil through the hose ⑤ using a funnel or squeeze container. The oil level must be between the red and green rings ②.
- While filling, turn mechanism slowly, by hand, so that any air bubbles can escape. Turn the framing knob between the left and right stops several times to distribute the oil. If necessary add more oil.
- Put the cap onto the oil gauge and hang the hose ⑤ back in the clip. Do not put the shipping cap on the hose; throw it away.

► **NOTE**

- ▷ The quantity of oil to fill the movement is about 6.8 fl. oz (200 ml).
- ▷ Do not overfill the intermittent.

2.4.2 Installing and Connecting the Lamphouse Components

► NOTE

- ▷ Connecting the lamphouse should be carried out by service personnel.
- ▷ The installation and adjustment of the xenon bulb and the adjustment of the intensity of currents is described in the lamphouse manual.
- ▷ The mirror should only be installed and adjusted by trained service personnel. The reflector should only be changed and adjusted roughly by the projectionist in case of need, therefore see lamphouse manual.
- ▷ You will find the lamphouse connecting plan in chapter 8.3.

2.4.3 Connecting the Water Cooling (option)



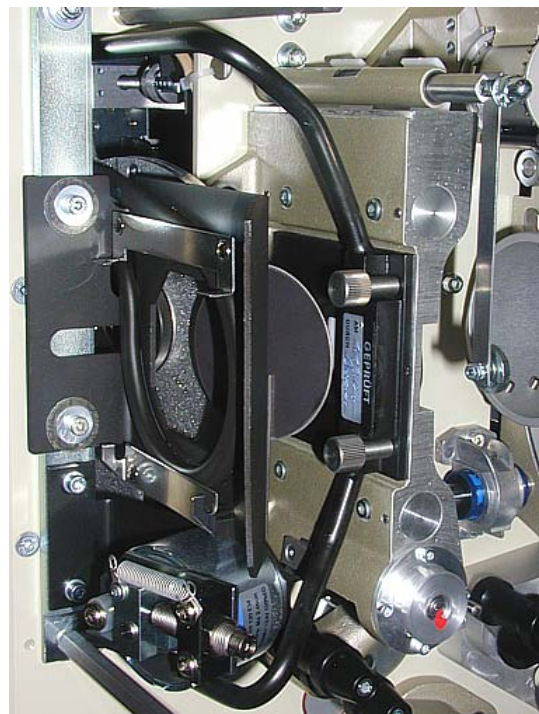
ATTENTION

- △ A water flow of 2 to 3 l/min is needed to get a water temperature of $18^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($64^{\circ}\text{F} \pm 10^{\circ}\text{F}$).
- △ The water temperature should not be less than 16°C , otherwise water can condense on pipes, cables and film running components and finally results in damage of the film material. At bad conditions dropping water can damage the electronics.
- △ If possible the heat exchanger must not have more than 10 m distance to projector and refrigerating set must not have more than 15 m distance to heat exchanger. If environment temperature is high and wires are long, the hose is to be isolated because of condensation water.
- △ At bad climatic conditions (high temperature, high humidity) condensation can also occur above 16°C - in this case please check the projector.

- Connect the inlet and outlet tubes of the water cooling system to the connecting pieces in the projector.

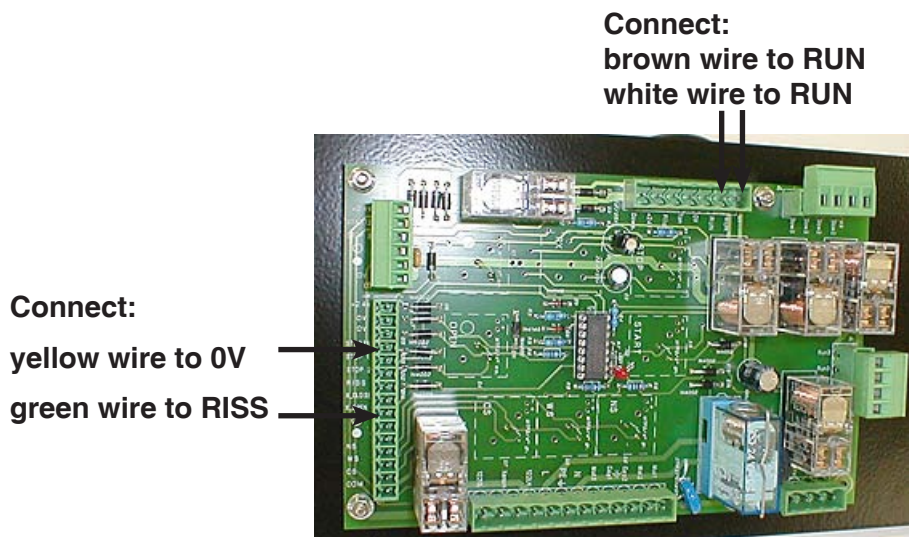
► NOTE

You will find the description of the water cooling unit in the corresponding operating manual.



2.4.4 Connecting the Non-Rewind System to the Projector

- Connect the 4-pole cable from the non-rewind system to the FPA-81-01 main board in projector which is positioned behind the operating panel.



► NOTE

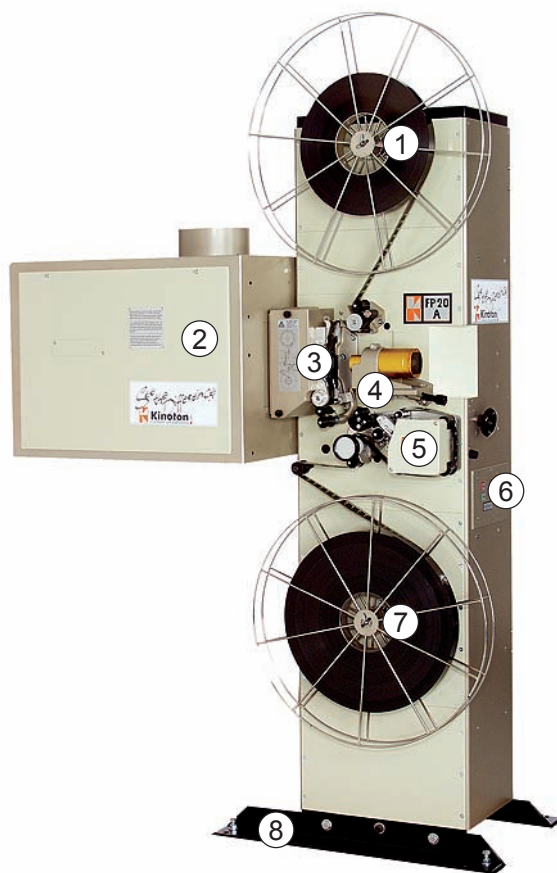
- ▷ The installation of the non-rewind system is described in "ST 200 E / MT 600/2000" or FT 3 M operating manual.
- ▷ The roller set for the film run between the projector and the non-rewind system should not be mounted until the projector has its final position to the screen.

3 Function and Components

The FP 20 A projector is suitable to reproduce 35 mm film and sound formats in small, medium and large cinemas.

- » The film is transported through projector from the top to the bottom.
- » The intermittent sprocket is driven by the Maltese cross.
The drive motor is coupled via a synchronous drive unit to the intermittent movement.
- » The projector is equipped with mechanical friction drives.
 - The lower take-up friction is driven via a chain by the main drive motor.
- » The film can also be guided via a set of guide rollers to and from the non-rewind system.
- » An optional film break sensor recognizes an available film.
If a film break has happened the projector motor is stopped and the dower is closed.
- » The lenses can be stored in a lens holder or optionally in a lens turret (two-folded or three-folded).
- » If the projector is equipped with a remote controlled lens turret which changes the lenses electronically an aperture changer changes simultaneously the corresponding aperture.
- » The projector can be equipped with a universal lamphouse (1000 to 2000 W or 2000 to 7000 W).
- » The reverse-scan sound device is mounted on the projector head. It is suitable to reproduce analog sound and optionally digital sound DOLBY SR·D.

3.1 Components Overview



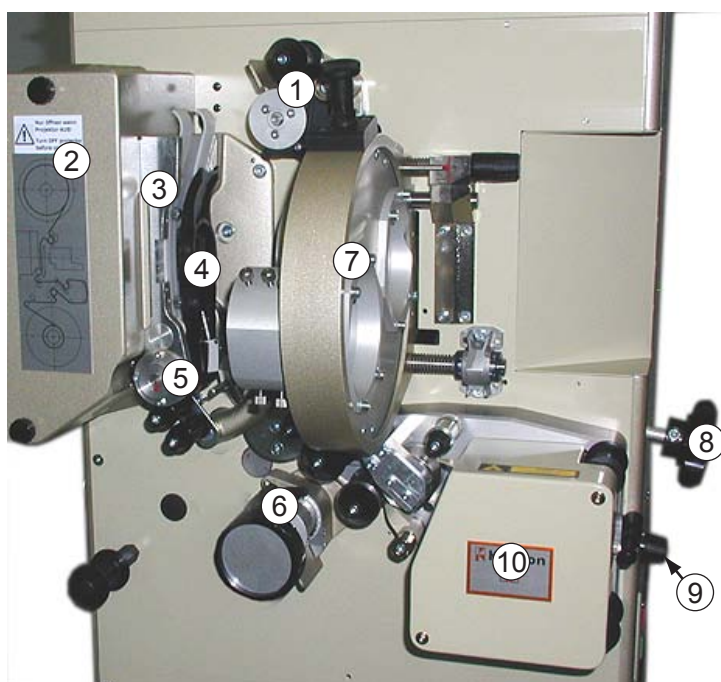
- ① Take-off friction with film spool
- ② Lamphouse
- ③ Shutter housing and film gate
- ④ Lens holder
- ⑤ Reverse-scan sound device
- ⑥ Operating panel
- ⑦ Take-up friction with film spool
- ⑧ Pedestals (adjustable)

3.1.1 Housing

Projection equipment, sound devices, frictions or/and set of guide rollers are mounted on the housing.

Drives, motors and the whole electrical equipment are mounted in the projector housing.

3.1.2 Projection Components Overview



- ① Feed sprocket
- ② Shutter housing
- ③ Film gate
- ④ Film pressure skate
- ⑤ Intermittent sprocket
- ⑥ Bottom / holdback sprocket
- ⑦ Lens turret (option)
- ⑧ Framing knob
- ⑨ Skate pressure adjusting knob
- ⑩ Reverse-scan sound device

3.2 Film Gate and Film Track

In the film gate the film is positioned precisely. By adjusting the film pressure skate you can optimize the picture steadiness.

After threading the film, close the film track with the film pressure skate to guide the film. The four ceramic rollers guide the film laterally.



- ① Shutter housing
- ② Film gate
- ③ Film runner strips (2)
- ④ Ceramics roller (4)
- ⑤ Film pressure skate
- ⑥ Intermittent sprocket
- ⑦ Aperture changer (option)

3.2.1 Film Pressure Skate

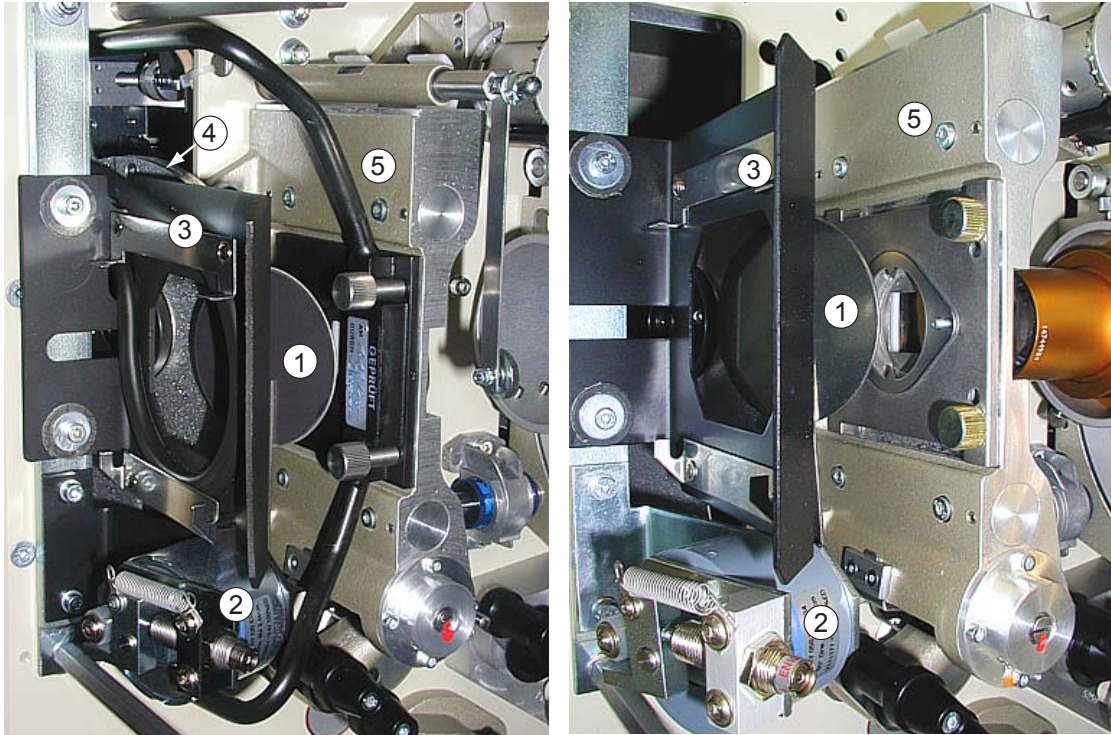
For smooth and silent film running it is very important that the pressure of the film skate is adjusted accurately.

► **NOTE**

- ▷ Adjusting the film pressure skate, see chapter 6.4.2.
- ▷ Adjusting the height of the film pressure skate, see chapter 6.4.3.

3.2.2 The Dowser

The dowser opens or closes the path of xenon light to the film gate.



- ① Dowser
- ② Dowser rotation solenoid
- ③ Light baffle
- ④ Rotary shutter
- ⑤ Film gate with water cooling unit or fire protection plate



ATTENTION

If the dowser does not close while the projector is stopped, the film will burn.

3.2.3 Single Aperture Plates (only with manual lens turret or lens holder)

Push the single aperture plate into the film gate until the stop is reached and the aperture plate snaps into position.

3.2.4 Aperture Changer (option, only with electronic lens turret)

The aperture changer is suitable for automatically changing the aperture when the corresponding format key has been pressed. Simultaneously the lens is changed too.

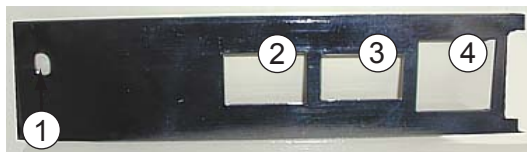


① Aperture changer

② Aperture

③ Drive pin (with knurled nut installed)

- Push the aperture into the film gate and place the aperture changer drive pin into the hole on the aperture. Tighten the knurled nut on the drive pin.



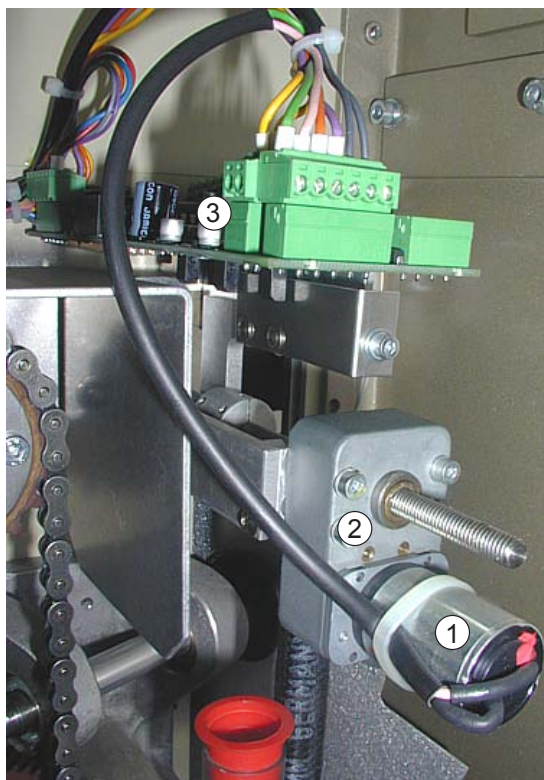
① Hole for drive pin

② 1:1.66 aperture

③ 1:1.85 aperture




④ 1:2.39 aperture

3.2.4.1 Drive and Control





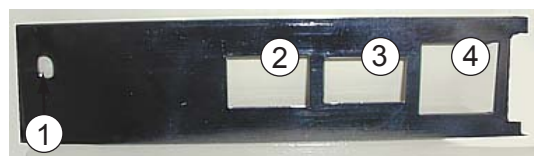
- ① Aperture changer motor
- ② Aperture changer drive
- ③ Aperture changer/lens turret control board

3.2.4.2 Format Change with Three Lenses


- Push ,  or  on the operating panel.
- The aperture changer places the selected aperture into the film gate and the matching lens in position.

3.2.4.3 Format Change with Two Lenses Turret

- Push  or  on operating panel (if existing).
 - If the lens turret is equipped with two lenses and the aperture has three openings you can select any two of the three aperture openings to work with the two lenses. For example for some shows the format change could be between CS (CinemaScope) and WS (1:1.85) and for other shows the format change could be between WS (1:1.85) and NS (1:1.33).
- The following format combinations are available:
- format combination ② and ③ or
 - format combination ③ and ④ or
 - format combination ② and ④



3.2.4.4 Changing the Format Combination

- The “select” function is activated by holding the  control closed more than 2 seconds.
- The turret will not rotate. The turret solenoid makes a clattering sound which means that a new format combination has been selected.
- The format combination changes to the next combination, for example:
 - from ② and ③ to ③ and ④.
 If you activate the “Select” input again the format combination will be changed again, for example:
 - from ③ and ④ to ② and ④ and so forth. After the “Select” input was selected three times, the combinations repeat.

► NOTE

Check your selection and push WS (flat) or CS (scope) button. The turret turns to the selected lens and the aperture changer changes to the selected aperture.

► HINT

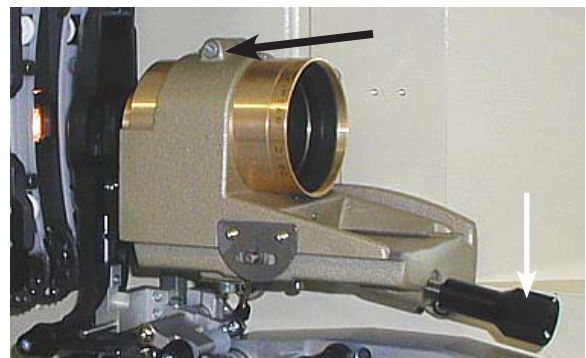
Make a note which shows you which aperture combination is chosen after how many times the SELECT button was pushed.

► NOTE

- ▷ Changing the aperture changes the lens too, see also lens turret, chapter 3.2.6.2.
- ▷ If the projector is equipped with an aperture changer do not push single aperture plates into the slit, because there is no stop and lock device for that aperture plate.

3.2.5 Lens Holder

- Loosen the clamping screw (black arrow) for inserting a lens and then tighten the screw again.
- For focusing turn the focusing adjusting knob (white arrow).

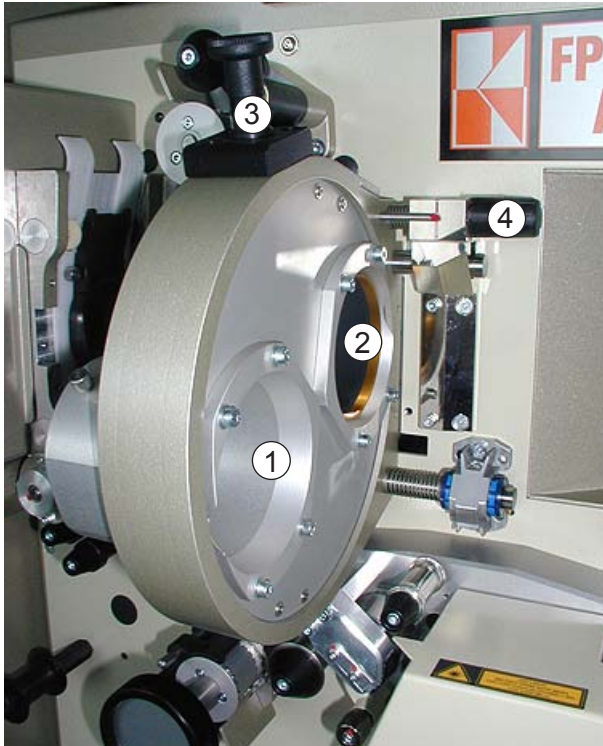


► NOTE

Adjusting the lens holder, see chapter 6.4.5.

3.2.6 Lens Turret (option)

3.2.6.1 Manual Lens Change



- ① Lens tube
- ② Lens in lens tube
- ③ Handle (arresting pin)
- ④ Focusing knob (manual)

- Loosen the knurled screws.
- Push the lenses into the lens tubes.
The tubes are labelled CS (1:2.40), WS (1:1.85) or NS (1:1.33).
- Precisely focus each lens in its tube without adjusting the focus knob.
- Fasten them with the knurled screws.

► **NOTE**

Some lenses may require rings to support the rear section; these are available from Kinoton.

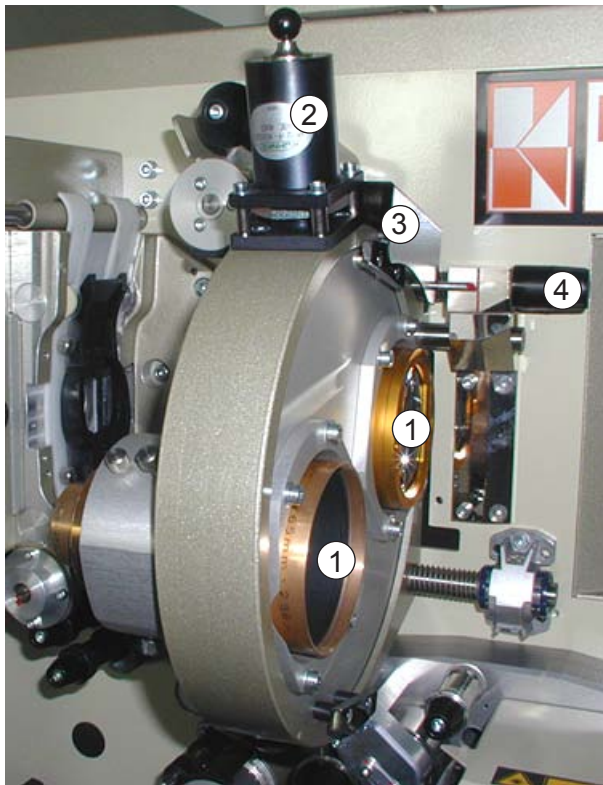
- To rotate a lens into position, pull out the handle and turn the lens turret to the desired position. Let handle drop – lens turret is positioned.

► **NOTE**

It is possible to set the handle so it remains up so that the turret can continuously rotate. This position is not used for normal operation.

3.2.6.2 Electronically Controlled Lens Change (option, not for FP 10 A)

The electronically controlled lens turret is suitable to change the lens automatically when the corresponding format key has been pressed. Simultaneously the applicable aperture is changed too.

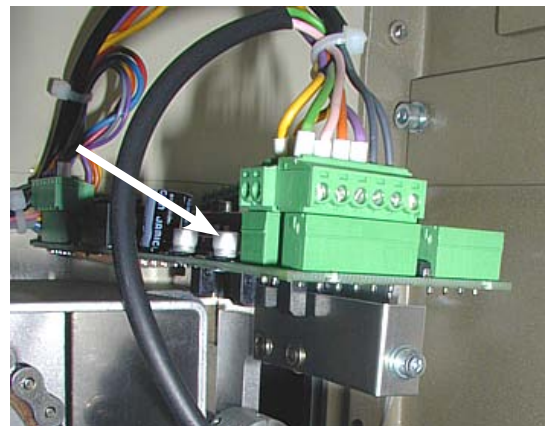
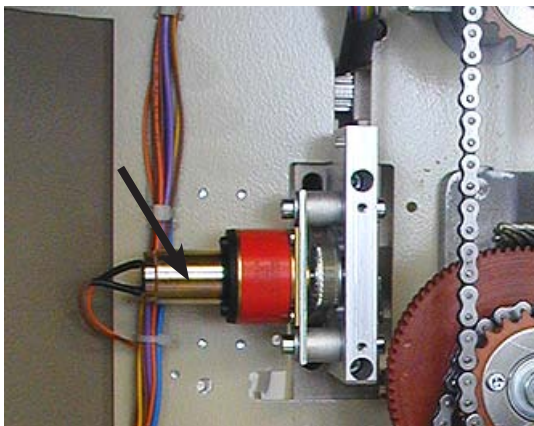


- ① Lens tubes with lenses
- ② Latching solenoid
- ③ Sensor board (covered)
- ④ Manual focusing

- To select a lens, push one of the format buttons.
 - The light barrier on the sensor board senses the position of the corresponding coding plate (one coding plate for one lens).
 - The lens turret will stop at that position and be magnetically latched.

Drive and Control

The lens turret/aperture changer control board (arrow, right figure) activates the turret motor (arrow, left figure), which changes the lens via a toothed belt.



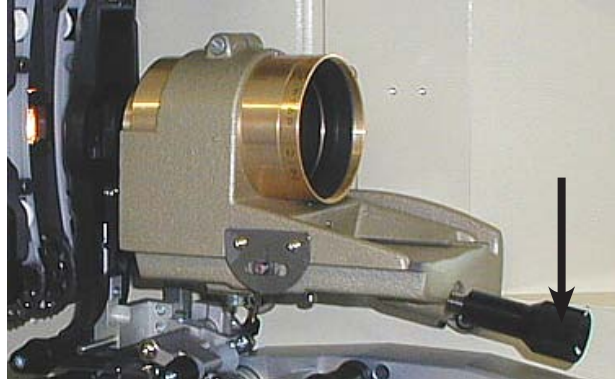
► NOTE

- ▷ When changing the lens the aperture is changed too (see also chapter 3.2.4).
- ▷ Initializing the EE-PROM should be only carried out by experts.

3.2.7 Focusing

To adjust the focus for a sharp picture on the screen, you have to move horizontally the whole lens turret or lens holder. This operation can be done manually.

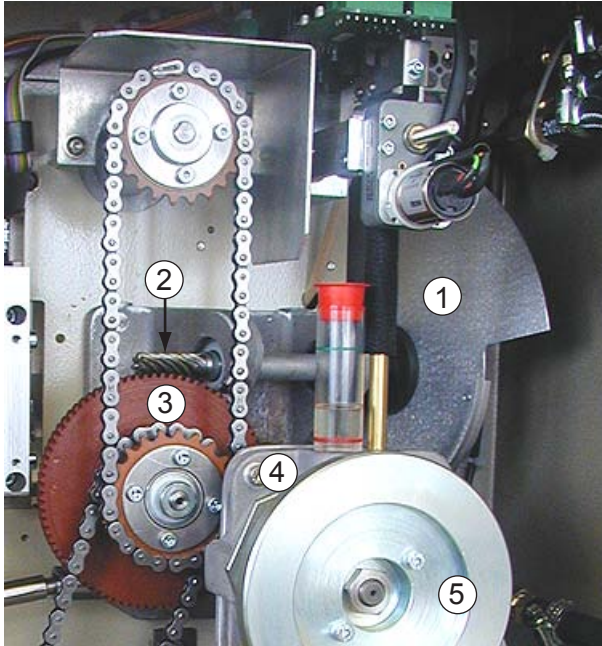
- Turn the focusing knob (arrows) to move the lens turret or the lens holder.
- ➡ The lens holder or turret moves towards the film gate or away from the film gate.



3.2.8 Rotating Shutter

The rotating shutter interrupts the projection light once during the film transport and once during the picture standstill. (48 interruptions a second at 24 pictures a second).

The shutter is mounted on a shaft which is driven from the intermittent movement via a fibre gear.



- ① Shutter (1-blade)
- ② Shutter shaft
- ③ Fibre gear and drive unit
- ④ Intermittent sprocket drive
- ⑤ Synchronous gear for main drive motor



DANGER

Only remove or replace the shutter housing when the projector is off.
If you have to work on the projector while it is running be very careful not to touch the rotating shutter. Serious cuts can result.



NOTE

The shutter is factory-set.

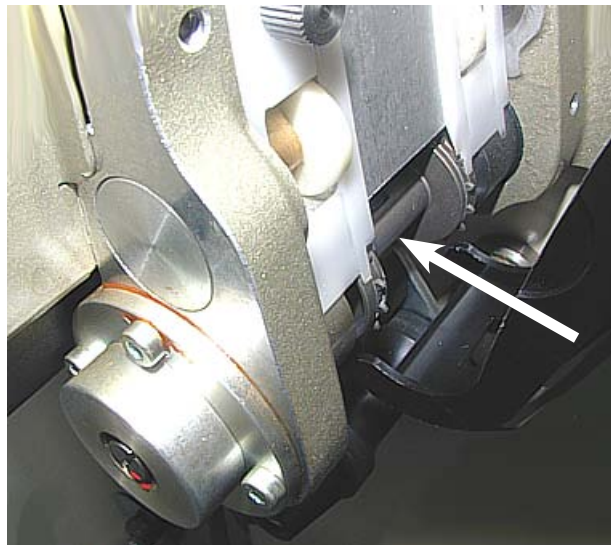
3.2.9 Intermittent Sprocket

The intermittent sprocket (arrow) is a very precise sprocket. It transports the film step by step through the film gate.

The intermittent sprocket is driven via the intermittent sprocket drive by the main drive motor.

► **NOTE**

The sprocket is factory-set.
All adjustment must only be carried out by experts.

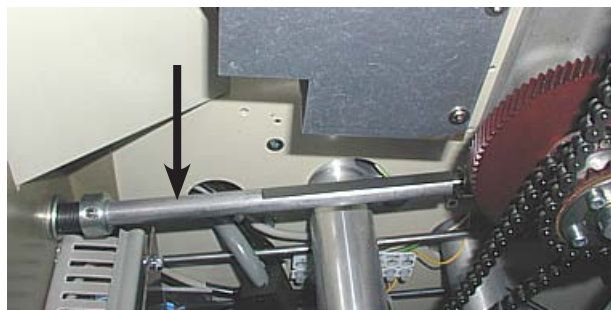


3.2.10 Framing

There is an adjustment to move the frame up and down because the picture must be positioned correctly in the film gate. The framing control should be kept in mid-position to allow correction in either direction. There are white position reference dots on the knob and projector for your convenience. These may not align exactly.

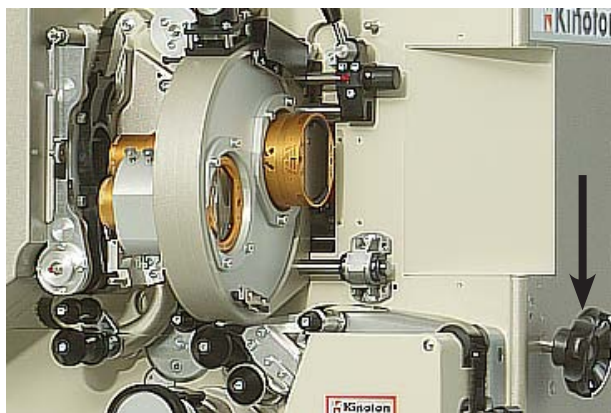
The intermittent sprocket and Maltese cross shafts have opposing splines and are connected with a bushing.

When sliding the bushing (by turning the framing knob and the framing shaft) the sprocket will rotate relative to the Maltese cross. With this action the adjustment of the shutter will not be changed.



Manual Framing

- Adjust the framing position by turning the framing knob (arrow).
- Turning the framing knob to the right => frame moves upwards
- Turning the framing knob to the left => frame moves downwards



3.2.11 Constant Speed Sprockets

Sprockets are designed to transport the film continuously. The teeth of the sprocket engage the perforations of the film. Both sprockets provide for equal loops before and after the film gate.



- ① Feed sprocket / bottom or holdback sprocket
- ② Pad shoe with handle
- ③ Ring nut with spring
- ④ Film stripper
- ⑤ Guide roller
- ⑥ Hand wheel

- » The feed sprocket (left figure) pulls the film from the take-off friction or platter to the film gate.
- » The bottom sprocket (right figure) pulls the film out of the sound head and feeds it to the take-up friction or platter.
- » The pad shoe holds the film on the sprocket.
- » The film stripper prevents broken film from being wound up around the sprocket.
- » With the handle you can open the pad shoe to thread the film.

Operating a Pad Shoe Gently

The pad shoe has a brass bearing tube which pivots on the pad shoe shaft, and is positioned with a ring nut and a spring.

To avoid damaging the pad shoe and causing the brass tube to revolve within the pad shoe, the pad shoe must be handled gently.

Follow these points:

- Do not slam the pad shoe closed.
- Only open the pad shoe as far as the stop pin.
- Do not open the pad shoe too far - over the stop pin - the spring will break and the brass tube will be damaged.

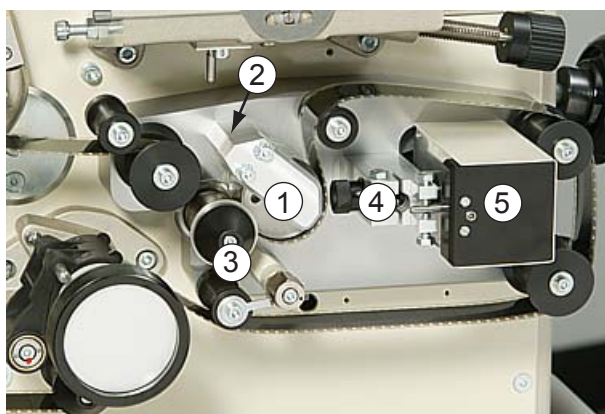
► NOTE

- ▷ Changing a constant speed sprocket and a pad shoe, see chapter 6.4.6.
- ▷ Adjusting the pad shoe spring, see chapter 6.4.7.
- ▷ Adjusting the distance between the pad shoe and the sprocket, see chapter 6.4.8.
- ▷ Adjusting the film break sensor, see chapter 6.4.9.

3.3 Reverse-Scan Sound Device

Reverse-scan sound devices scan the sound track (analog and optional DOLBY digital) on the film by means of red LEDs.

3.3.1 Analog Reverse-Scan Sound Device (non-upgradeable)



- ① LED holder with LED
- ② Sound drum
- ③ Sound pressure roller
- ④ Analog sound optics
- ⑤ P.C. board with solar cell

► NOTE

A non-upgradeable analog reader will not accept cue detectors.

3.3.2 Reverse-Scan Sound Device Analog and optional DOLBY Digital (upgradeable)

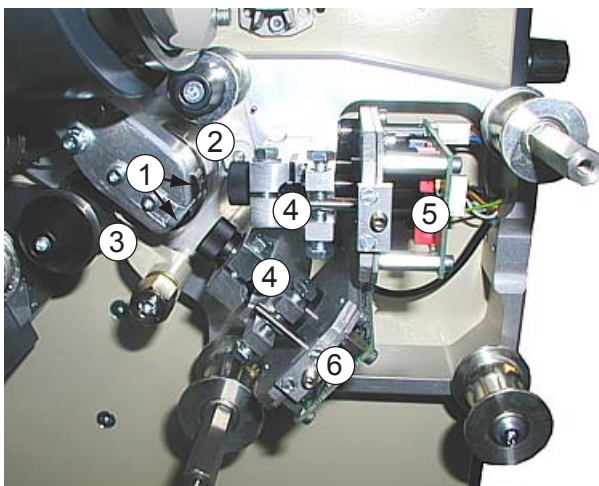
The Reverse-Scan Sound Device contains an analog sound reader and optionally a Dolby digital reader.



► NOTE

- ▷ An only analog sound device is upgradeable with DOLBY digital.
- ▷ The reverse scan sound head is delivered factory checked and adjusted.
- ▷ Optional cue sensors for reading metal foil tapes can be mounted in the reverse scan sound device.

Components



- ① LED holder with optional second digital LED
- ② Sound drum
- ③ Sound pressure roller
- ④ Analog (upper) and optional digital (lower) sound optics
- ⑤ P.C. board with solar cell (analog)
- ⑥ P.C. board with CCD-unit (digital)

3.3.3 Sound Tracks on the Films

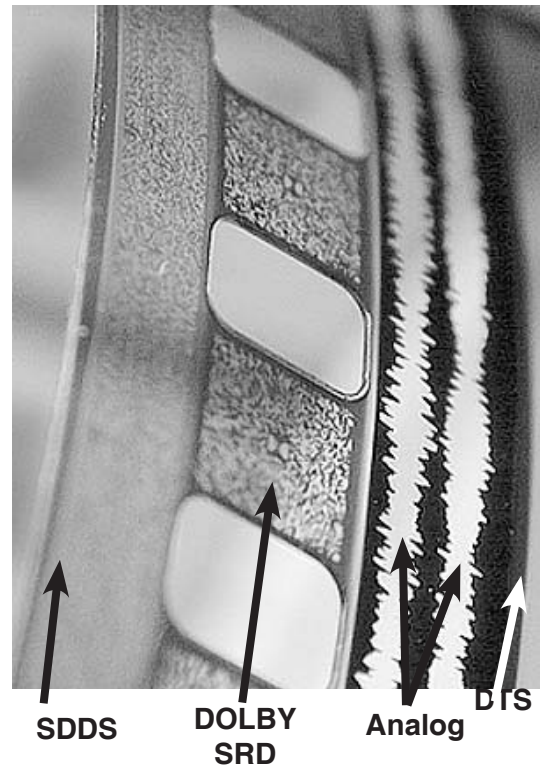
The **analog sound** is printed as two wavy lines on the film.

The height of the amplitude signifies loudness, frequency signifies pitch.

The **Dolby digital sound** information (DOLBY SR·D) is encoded between the perforations.

The **DTS digital sound** information is encoded between the picture and the analog sound track.

The **SDDS** information is encoded on the edges of the film.



3.4 SDDS Reader / DTS Reader (option)

Optionally a DTS Reader and/or SDDS Reader can be attached to special holders on the projector for reading the corresponding sound track on the film.

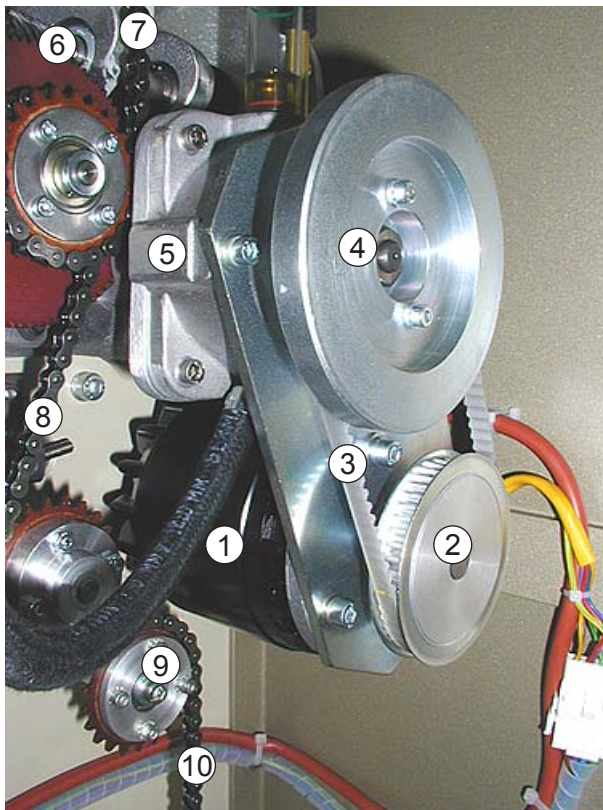
3.5 Film Cleaner (option)

Optionally the projector can be equipped with a film cleaner.

3.6 Drives

► NOTE

- ▷ In this chapter you will get an overview of the drive components.
- ▷ All work on drives should be only carried out by experts.



- ① Main drive motor
- ② Synchronous gear on motor shaft
- ③ Toothed belt between the synchronous gears
- ④ Synchronous gear on intermittent movement shaft
- ⑤ Intermittent movement
- ⑥ Fibre gear: drives shutter and sprockets
- ⑦ Chain to upper/feed sprocket shaft & cog
- ⑧ Chain
- ⑨ Lower/holdback sprocket shaft & cog
- ⑩ Chain to take-up friction shaft & cog

3.6.1 Main Drive

Via gears the following shafts are driven by the main drive motor ①:

- » Intermittent movement ⑤ via a synchronous drive ② + ④
- » Feed sprocket
- » Bottom sprocket ⑨
- » Shutter ⑥
- » Take-up friction shaft

A drive with two synchronous gears is necessary to synchronize the motor speed and the maltese cross speed. Therefore different drives are available for different frequencies (50 or 60 Hz) of voltage.

► NOTE

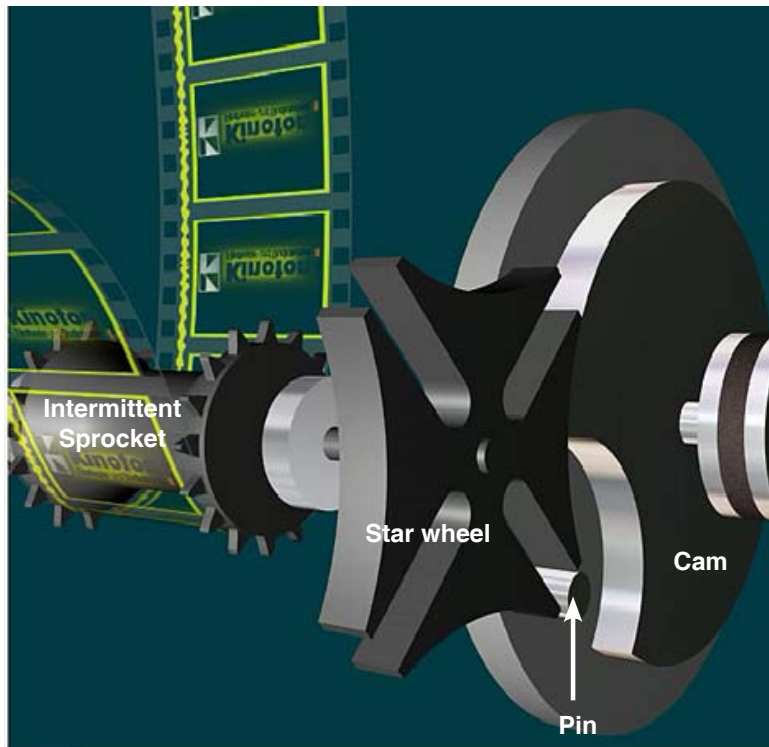
Tension the chains, see chapter 6.4.10.

3.6.2 Intermittent Movement (also called a Maltese Cross or a Geneva Movement)

To pull the film down one picture at a time the intermittent sprocket has to move the film ahead by four sprocket teeth ($\frac{1}{4}$ of a complete rotation):

A motor rotates the cam continuously. During each rotation the cam's pin engages one of the slots in the starwheel and pulls it $\frac{1}{4}$ turn. As soon as the pin leaves the slot, the outer surface of the cam engages the curved surface of the starwheel which prevents the starwheel from turning until the pin engages the next slot.

During this time the film is held still in film gate and is able to project the picture.



The intermittent movement is in a closed oil bath.

3.6.3 Friction Drives

The friction is a shaft, which is driven with a constant turning moment. The take-off friction is not necessary to be driven, because the take-up friction - which is driven by the main drive motor - pulls the film from the upper take-off shaft. Generally the spring pushes the driving disk and the felt disk ② against a fitted disk. The more the pressure onto the felt disk the more is the braking effect.

3.6.3.1 Take-Off Friction (non-driven)

This “take-off clutch” provokes that a certain traction force is necessary to wind off the film. This friction prevents spinning of the film spool in case the projector suddenly stops which would cause film clutter – in the worst case the film material could be damaged or even break.



3.6.3.2 Take-Up Friction (driven)

As it is with the take-off friction where the braking force is regulated the film tension can be controlled by the take-up friction.

- Is it too strong, it brings too much tension to the sprocket which can lead to perforation damages.
- Is it too weak the film will be wound too loose. This can lead to film damages during rewinding (scratches, etc.).



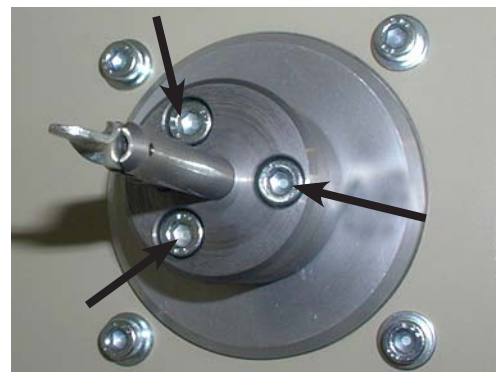
► NOTE

- ▷ Depending on friction (from 600 up to 2000 meters) the film tension has to be adapted.
- ▷ The film tension is inversely proportional to the reel diameter:
The film tension is less, when the reel diameter is large (beginning of take-off friction).
- ▷ Changing and oiling the felt disk of the friction is described in chapter 6.4.10.
- ▷ Adjusting the mechanical friction, see chapter 6.4.11.

3.6.3.3 Reel Shaft on Change Flange

The reel shaft is attached with a changeable flange. To change the flange loosen the 3 Allen screws (arrows) and change the flange.

To fix a film spool/reel you have either to close the lock bar or the screw on a knurled nut.



3.7 Electronic Components

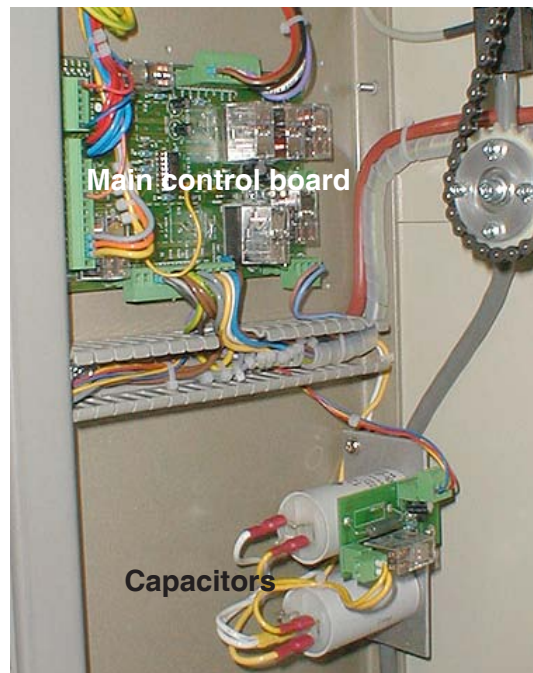
► **NOTE**

- ▷ In this chapter you will get an overview of the electronic components, which are mounted in the projector.
- ▷ All work on electronic parts should be carried out by experts.

3.7.1 Main Control / Interface Board

► **NOTE**

- ▷ Plan of terminal connections, see chapter 8.3.
- ▷ Wiring scheme, see chapter 8.3.1.



3.7.2 LED Power Supply Board for the Reverse-Scan Sound Device

The LED board can be designed for supplying the analog sound LED only or for supplying also the digital sound LED.

The LED board is powered via the projector by 24 V.



4 Operating Elements

4.1 Main Switch

You will find the main switch on the projector housing lower front side.

Main switch in position I:

Current transfer is switched on.

The switch lights up red.

Main switch in position 0:

Current transfer is switched off.

The switch is off.

4.2 Operating Panel



Standard buttons:


STOP	Projector STOP
START	Projector START
OFF	Dowser CLOSE
ON	Dowser OPEN

Optional buttons remote controlled with lens turret / aperture changer:


C	Format CS	W	Format WS
N	Format NS (for 3-folded lens turret)	Select	Format SELECT (for 2-folded lens turret)

5 Operation, Threading and Troubleshooting


5.1 Switch On and Start the Projector

- Switch on the external power supply for the performance room.
- Switch on the main switch  (position “I”).
➤ The switch illuminates red.
- Thread the film (see chapter 5.3).
- Push the projector **START**.
➤ The projector is running, ventilation is on, xenon lamp is on.
- If necessary push **ON**, to open the dowser after the start leader has run through.

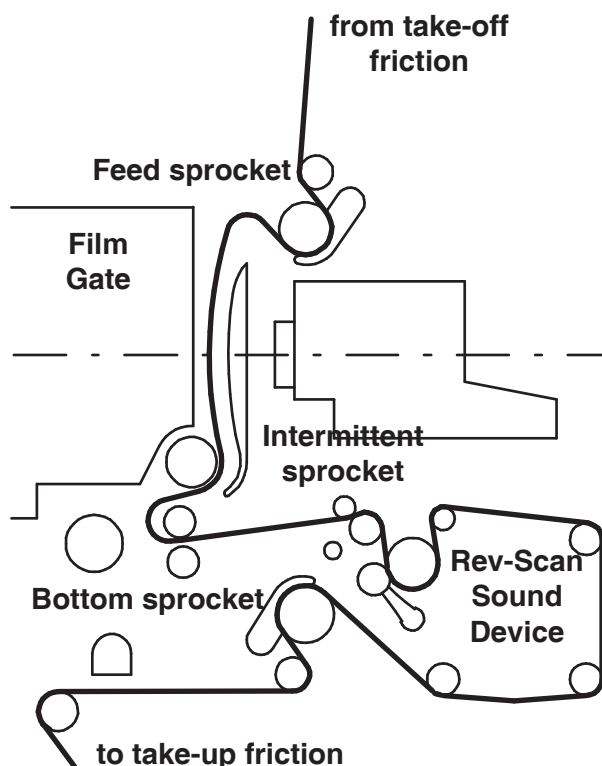
5.2 Stop and Switch Off Projector

- To stop projector manually push **STOP** and close dowser by pushing **OFF**.
➤ The dowser closes, the xenon lamp turns off, the projector stops and the ventilation is on (if temperature is more than 60° C).
- Switch off the main switch  (position “0”).
➤ The key lamp gets off.
- Switch off the external power supply for the performance room.

► NOTE

- ▷ If you have an emergency stop, push the main switch  (position “0”), to cut the power.
- ▷ If the film is run through the projector stops due to the film break sensor.

5.3 Threading for Projection Operation



- Put the full reel on the upper reel shaft or prepare the platter system.
- Open the sprocket pad shoe.
 - Thread the film in the feed sprocket (all perforations engaged in sprocket teeth).
 - Close the pad shoe.
- Thread the film in the film gate.
 - Close the film pressure skate.
 - One whole frame must be centred vertically in front of the aperture opening. There is a small light inside the aperture to assist in centring.
 - Assure the film is centred horizontally between the ceramic discs.

A film loop of about 4 frames - 16 perforations (35 mm film) must be left both just above and just below the gate! If the loops are too big the film will touch stationary parts and be scratched. If the loops are too small the film may break, the image may jump, or the sound may warble.

- Thread the film through the guide rollers to the sound head (35 mm film) and then to the bottom sprocket. The sound pressure roller may be lifted to ease threading.
- Open the sprocket pad shoe.
 - Thread the film in the holdback/bottom sprocket (all perforations engaged in sprocket teeth).
 - Close the pad shoe.
 - Verify the loop below the gate is still OK.
- Wind-up the film several times around the take-up reel or lead film to "take-up" level of platter system.

► NOTE

- ▷ When operating the projector with the handwheel, do not jerk (quickly twist) the handwheel; instead start its rotation gently and smoothly. Abusing the handwheel can break teeth from the lower CSS shaft's fibre cog.
- ▷ If a DTS reader is installed the film has run from the top of the spool - spool turns right.

5.4 Troubleshooting

5.4.1 General Hints

Even though we produce high quality, reliable equipment, there still can be problems due to incorrect operation, poor maintenance, incorrect procedures etc.

This chapter has information about some common problems and about solving those problems. It is not possible to cover all possible problems in an operating manual; we suggest each owner develops a relationship with a competent cinema service provider.

► NOTE

- ▷ Items marked (service) usually require experienced service technicians.
- ▷ Basically there are two types of errors:
 - Type 1 errors: projector won't run/stops immediately
 - Type 2 errors: errors which do not stop projector

5.4.2 Projector Troubleshooting Chart (Type 1 errors)

Error	Cause	Solution
Nothing works	<ul style="list-style-type: none"> - main power is not available - loose main power connection - 24 V DC supply failed - 24 V DC fuse on main terminal blown 	<ul style="list-style-type: none"> - check fuses or circuit breakers - check main power connections - change (service) - change
Motor runs, pilot lamp is on, sound-head LED won't lit	<ul style="list-style-type: none"> - fuse blown on LED power supply board 	<ul style="list-style-type: none"> - check all, replace if blown

5.4.3 Projector Troubleshooting Chart (Type 2 errors)

Error	Cause	Solution
Noisy operation	<ul style="list-style-type: none"> - film is threaded incorrectly - chains and/or gears are worn - outboard intermittent bearing worn - intermittent movement is worn [rare] 	<ul style="list-style-type: none"> - thread correctly - change - change (service) - change (service)
Rollers don't turn	<ul style="list-style-type: none"> - poor cleaning - roller worn or damaged 	<ul style="list-style-type: none"> - clean regularly with alcohol - change
Film break when starting the film run	<ul style="list-style-type: none"> - frictions are not adjusted correctly - friction shafts are running dry 	<ul style="list-style-type: none"> - adjust - lubricate with Cardan oil
Oil leak	<ul style="list-style-type: none"> - wrong oil - too much oil - oil tube / vent is blocked - seals are defective [clean unit with alcohol; find leak's source] 	<ul style="list-style-type: none"> - use Kinoton 3672 oil - reduce oil quantity - clean oil tube / vent - replace seals (service)
Foam in oil gauge glass	<ul style="list-style-type: none"> - wrong oil - too little oil 	<ul style="list-style-type: none"> - use Kinoton 3672 oil - fill oil

Error	Cause	Solution
Picture moves horizontally (waves)	<ul style="list-style-type: none"> - ceramic discs are blocked or dirty - ceramic discs are worn [rare] 	<ul style="list-style-type: none"> - remove and clean - change
Picture moves vertically (jumps)	<ul style="list-style-type: none"> - skate pressure isn't adjusted correctly - skate height isn't adjusted correctly - film print defective [test film] - skate is worn - intermittent sprocket damaged - framing bushing defective - intermittent movement defective [rare] 	<ul style="list-style-type: none"> - adjust - adjust - get new print - change - change (service) - change (service) - change (service)
Perforation damage in direction of travel	<ul style="list-style-type: none"> - skate pressure is too strong - intermittent or upper/feed sprocket teeth have worn 	<ul style="list-style-type: none"> - adjust - change the worn sprocket(s)
Perforation damage against moving direction	<ul style="list-style-type: none"> - take-up friction is too strong - lower/holdback sprocket teeth have worn 	<ul style="list-style-type: none"> - adjust - change the worn sprocket
Perforation side damage	<ul style="list-style-type: none"> - sprocket teeth are damaged - pad shoe is damaged - film gate position is not correct [rare] 	<ul style="list-style-type: none"> - change sprocket - change pad shoe - adjust
Scratches on film	<ul style="list-style-type: none"> - film loop is too large - emulsion particles / dirt on rollers - rollers, skate, and/or film runner strips are defective or worn 	<ul style="list-style-type: none"> - thread film correctly - clean - change the worn or defective part
Picture blurring	<ul style="list-style-type: none"> - shutter is not adjusted correctly - skate pressure too low 	<ul style="list-style-type: none"> - adjust (service) - increase pressure
Soft image	<ul style="list-style-type: none"> - dirt on lens elements 	<ul style="list-style-type: none"> - properly lens clean front and rear
Unable to stay in focus	<ul style="list-style-type: none"> - excessive heat from xenon lamp 	<ul style="list-style-type: none"> - decrease xenon current and/or use IR heat filter - replace damaged IR heat filter - make sure light is properly distributed (no "hot spot")
Misframed image	<ul style="list-style-type: none"> - incorrect threading - misframed splices 	<ul style="list-style-type: none"> - thread properly - re-make specific bad splice
Automatic aperture registers imprecisely	<ul style="list-style-type: none"> - aperture or operating arm was moved by hand - operating arm tube has been lubricated 	<ul style="list-style-type: none"> - do not force automatic aperture. - If mechanism has been damaged, see service information on reducing play. - clean well with alcohol - Do not lubricate the operating arm tube.

5.4.4 Analog Sound

Error	Cause	Solution
No sound / some channels missing	<ul style="list-style-type: none"> - sound processor failure - amplifier failure - speaker failure - sound device is defective 	<ul style="list-style-type: none"> - check plugs and power; call service - check if sound track is threaded on the correct side - check / replace exciter lamp (standard sound) or red LEDs (rev. scan sound) - check all equipment for blown fuses / tripped circuit breakers
Sound out of sync with picture	<ul style="list-style-type: none"> - lower loop wrong size - wrong threading path 	<ul style="list-style-type: none"> - thread correctly - thread correctly
Loss of high frequencies	<ul style="list-style-type: none"> - dirty sound optics - sound optics focused poorly 	<ul style="list-style-type: none"> - clean with lens cleaner and Q-tip - adjust sound optics' focus (service)
Garbled sound	<ul style="list-style-type: none"> - scanning drum jammed - sound pressure roller loose 	<ul style="list-style-type: none"> - remove blockage; change or oil bearings - adjust tension (service)
Hissing sounds	<ul style="list-style-type: none"> - scratches on sound track - dirt on sound track - defective sound electronics 	<ul style="list-style-type: none"> - replace print - clean - check and replace (service)

5.4.5 Digital Sound

Error	Cause	Solution
No sound	- check the following [also see the "no sound / some channels missing" section of "Analog Sound", above.]	<ul style="list-style-type: none"> - use film for digital playback - switch on digital sound processor - switch correct processor mode - load disk loaded correctly and check the right disk is in place [DTS only] - thread film correctly
Sound out of sync with picture	<ul style="list-style-type: none"> - loops wrong size - wrong threading path 	<ul style="list-style-type: none"> - thread correctly - thread correctly
Poor digital sound	<ul style="list-style-type: none"> - improper tension - dirt on lens - dirt on digital sound track - scratches on digital track 	<ul style="list-style-type: none"> - re-thread - remove dust using compressed air - clean digital soundtrack - replace print

6 Cleaning / Maintenance / Repair

6.1 General Hints



ATTENTION

- △ Any work on the electric supply wiring must be carried out by electricians.
- △ Make sure that nobody starts the projector while you are working on it.
For all maintenance, cleaning and repair you must disconnect the projector from its power supply (switch off the main switch).
- △ All adjustments must be carried out by experts.

Because of using many maintenance-free parts, the consumption of material and the expenditure of time for maintenance work and repair are reduced to a minimum.

The necessary maintenance and cleaning work may be performed by the projector's operators. This work has to be carried out regularly and carefully. See the following lists regarding the schedule for this work.

6.2 Cleaning

► NOTE

The film print should not be used oily or dirty with antiblocking agents, but always clean and dry.

After each show

Component	What is to do?
film path / aperture	Clean with a soft toothbrush or cloth / Blow out with air pressure.
sprockets / pad shoe	

Daily

Component	What is to do?
film path / aperture	Clean with a soft toothbrush or cloth / Blow out with air pressure.
sprockets / pad shoe	
lens	Clean with a lens cleaning brush.



ATTENTION

- △ Using air pressure can make problems, because the dirt will not be absorbed but pressed into bushings and optics.
- △ Never use sharp objects to remove particles from film path.

Every 2 weeks

Component	What is to do?
ceramics roller	Remove the ceramics rollers and then remove the dirt in the holes by using air pressure. Clean the ceramics roller with a alcohol moisturized cloth.

Every 3 months

Component	What is to do?
film break sensor	Clean the film break sensor with a soft cloth.
main drive motor / fan	Blow out the dust with pressurized air.
guide rollers	Clean the guide rollers and roller shafts with alcohol.
spool shafts	Lubricate with Esso universal oil.

Every 6 months

Component	What is to do?
shutter / shutter housing	Clean the shutter housing with pressurized air. Clean shutter edges with a soft toothbrush.
lens turret (if existing)	Clean the coding plates and the sensors on the sensor board with a Q-tip moisturized with Isopropyl or Isopropanol.

**ATTENTION**

Do not blow with pressurized air into the rotor - particles can be blown into the rotor and block the rotation.

6.3 Maintenance

Daily

Component	What is to do?
intermittent movement	Check oil level => oil level must be between the red and the green ring, if necessary refill oil, see chapter 6.3.2.

Every 3 months

Component	What is to do?
lens holder	Lubricate the lens holder guidance with Cardan oil, type 8657
fibre gear / shutter shaft worm	Lubricate with Kinoton EL 4854 grease.
chains	Lubricate with Esso universal oil.
aperture changer (if installed)	Clean the part of the shaft above the film path with a cloth, and the threaded part of the shaft (inside the back cover) with a brush. After cleaning lubricate the threaded part of the shaft with Klübertex BEM 43-132 or Esso universal oil. Do not lubricate the brass tube/non threaded parts of shaft!

Every 6 months

Component	What is to do?
Reverse-scan sound device	Check O-rings on sound pressure roller. Check all rollers, whether they run easily.

Annually

Component	What is to do?
sound reproducer	Lubricate the pressure roller ball bearings with a drop of Cardan oil, type 8657. Do not use any other lubricant! Lubricate the sound drum shaft with 1 drop of Esso universal oil.

► NOTE

- ▷ Cardan oil is very pasty therefore the ball bearings will be retarded for a proper film run. By getting move the guide roller with one finger, the roller has to stop at last after a half of turn. Otherwise you have to clean the bearing and then fill it with Cardan oil.
- ▷ You must not use any oil or grease!

water cooling (if existing)	Empty and clean and refill coolant. Check whether pump and refrigeration system are sealed and working properly.
-----------------------------	--

6.3.1 Drain and Refill Oil (Kinoton type 3672 oil):

- » after 50 operating hours after the first running
- » after 500 total operating hours or after a quarter of year
- » after every 4000 operating hours or once in a year, whichever comes first

6.3.2 Changing the Intermittent Oil

Procedure to change oil (Use Kinoton type 3672 oil only.):

- Remove the oil gauge cap and remove hose from clip. Move open end of hose down into empty container. Let the oil drain out completely. Add oil through the hose. The oil level must be between the red and green ring.
- During filling, turn the mechanism slowly, by hand, so that any air bubbles can escape. Several times turn the framing knob alternately between the left and right stops to distribute the oil. If necessary add more oil.
- Put the cap on the oil gauge and hang the hose back in the clip. There should be a vent hole in the oil gauge cap. There must not be any cap on the hose.

► **NOTE**

- ▷ The quantity of oil to fill the movement is about 6.8 fl. oz (200 ml).
- ▷ Do not overfill the intermittent.

6.4 Repair and Adjustments

6.4.1 Changing the Pilot Lamp



ATTENTION

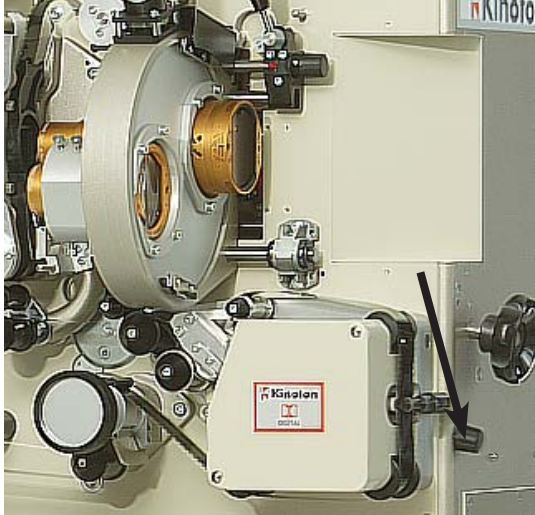
Before opening the shutter housing, wait until the shutter stands still!

- Remove the shutter housing.
- Put the screw driver behind the lamp socket and lift the lamp out of the socket.
- Push the new pilot lamp into the socket and close shutter housing.



6.4.2 Adjusting the Film Pressure Skate

The correct adjustment of the film pressure skate is mandatory in order to run the film easefully and steady-going and with minor wear and tear of projector and film copy.



- Reduce the skate pressure by turning the adjusting knob (arrow) such that the picture begins to shake vertically on the screen.
- The projector running noise becomes louder and more unsteady.
- Increase the skate pressure until the running noise becomes quietly and steadily and the picture steadiness is correctly.

► **NOTE**

- ▷ Only tighten the film pressure skate as much as is absolutely necessary!
- ▷ Pressure too low: The picture shakes on the projecting screen.
- ▷ Pressure too high: The sprocket teeth, film perforations, film pressure skate and runner strips will wear excessively and film emulsion will be left in the gate
- ▷ The necessary pressure of the skate depends on the used film material.
It is recommended to check the skate pressure again, after splices have run through the film gate and also after the film material has been changed.

6.4.3 Adjusting the Height of the Film Pressure Skate

The film pressure skate has to be adjusted so that it rides perfectly on the film gate and the intermittent sprocket.



- Loosen the setscrew (black arrow).
- Insert 2 superimposed film layers into the film gate.
- Screw the ball pin (white arrow) out or in to the desired length - the skate should just not be moved vertically. You can use an Allen wrench in the holes of the ball pin to rotate it.
- ➡ Without any film layers in the film gate the skate must have clear tolerance.
- When the adjustment is adjusted correctly fasten the setscrew again.

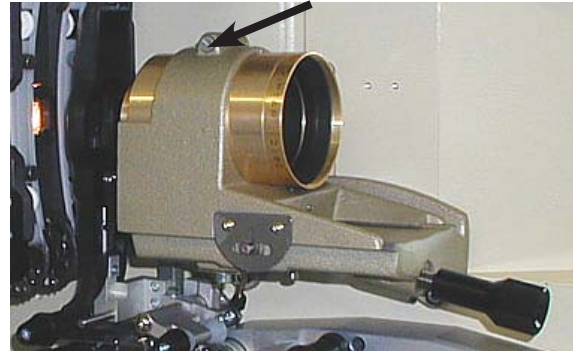
6.4.4 Changing the 35 mm Film Runner Strips



- Loosen the knurled fastening screws and remove the old runner strips and insert the new runner strips.
- ☛ They must lay in parallel to the vertical film gate edges.
The small spring-suspended ceramic rollers must have a free clearance.
- ☛ The seat is correct, if the conic ending running strips are lying lightly on the sprocket without touching the teeth, so that a perfect film run even with splices is assured in both directions.
- Tighten the knurled screws.

6.4.5 Adjusting the Lens Holder

- For setting up lenses, set scale in the mid-position.
- Loosen the clamping screw (arrow) and push the lens into the holder until picture is sharp (basic adjustment).
- Tighten the clamping screw again.
- Repeat the adjustment for each lens without turning the focus knob.
- To adjust the picture focus finally turn the knob slightly as required.



6.4.6 Changing a Constant Speed Sprocket / Pad Shoe

- Loosen the locking nut (black arrow) and the adjusting nut (white arrow) of the pad shoe with the special tool – the spring will relax.
- Pull the pad shoe from its shaft.
- Loosen the film stripper setscrews (two black arrows) and remove the film stripper.
- Turn the sprocket locking screw (on sprocket surface) anticlockwise five to six turns to loosen the sprocket.
- Pull the sprocket from its shaft.



► NOTE

If the teeth of sprocket are worn on one side only, you can turn it and use the other side (not with combined sprockets). Otherwise you must replace the sprocket.

- Install the sprocket onto the shaft with a slight counter-pressure on the belt wheel in the projector.
- Tighten the locking screw on the sprocket again.

► NOTE

The sprocket end play should be between .0004" (0.01 mm) and .001" (0.03 mm).

- Put on the film stripper again and fasten the 2 stripper setscrews in a way that it does not touch the sprocket surface.
- Grease the pad shoe shaft with Cardan oil and then put the pad shoe onto the shaft.
- Place the torsion spring in the hole of spring cage and place the whole assembly in pad shoe again.

► NOTE

Be sure that spring end is placed exactly in hole of pad shoe.

6.4.7 Adjusting the Tension of the Pad Shoe Spring

- Loosen the locking screw (black arrow) with an Allen key.
- Adjust the tension of the spring by turning the adjusting ring (white arrow) clockwise with a special tool.
- The pad shoe pressure should be (measured on pad shoe with a spring scale):
 - 450 g \pm 50 g at open condition and
 - 150 g to 250 g at closed condition.
- After adjustment lock the spring by tightening the locking screw (black arrow) again.

6.4.8 Adjusting the Distance between Pad Shoe and Sprocket

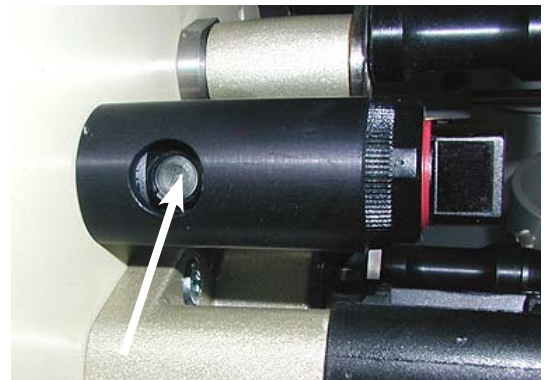
- Turn the adjusting screw (arrow) until a gap of 2 film layers is generated between the sprocket and the pad shoe.
- After adjustment paint-lock the adjusting screw.



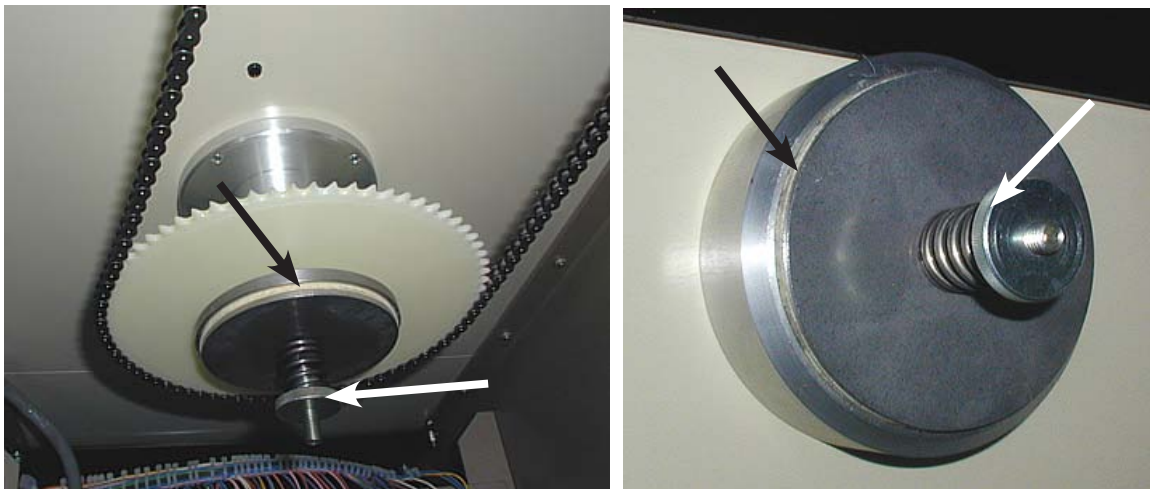
6.4.9 Adjusting the IR Reflex Film Break Sensor

Position the sensor (arrow) in a way that it “looks” vertically towards the film surface. The sensor’s view must be perpendicular to the film.

- To adjust the sensitivity of the sensor thread a film and turn the plastic screw (arrow) with a screw driver until the red LED (adjusting aid) blinks.
- Then turn the screw until the LED surely lights steadily.



6.4.10 Changing and Lubricating the Felt Disk of the Mechanical Friction



- Remove the knurled nut, the spring, the friction plate and the felt disk on the friction shaft (black arrows).
- Once in a year the felt disk should be put in a Cardan oil bath. If the felt disk is worn (surface is hardened) it has to be changed and oiled.
- Mount the friction again.
- Thread a film and adjust the friction (see next chapter).

6.4.11 Adjusting the Mechanical Friction

Via the knurled nut (white arrows) the spring tension can be adjusted and therefore the pressure against the friction disk to the felt disk. Adjusting the frictions is necessary if the felt disk was replaced.

Adjusting the take-off friction:

- Put a full film spool onto the take-off friction shaft.
Thread the film and run the projector.
- Stop the projector - the film should not build a loop, otherwise the friction is adjusted with too small pressure.
- Turn the knurled nut clockwise to increase the pressure onto the felt disk.

Adjusting the take-up friction:

- The take-up film spool has to be nearly full, then stop the projector - the film should not build a loop.
- If necessary adjust:
 - Right turn of the knurled nut => spring increases the pressure
 - Left turn of the knurled nut => spring decreases the pressure

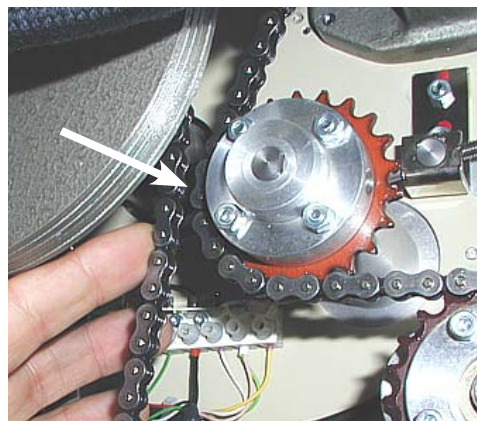
► NOTE

- ▷ Depending on the film reel length the film tension has to be adapted.
- ▷ The film tension is inversely proportional to the reel diameter:
The film tension is less, when the reel diameter is large (beginning of take-off friction)

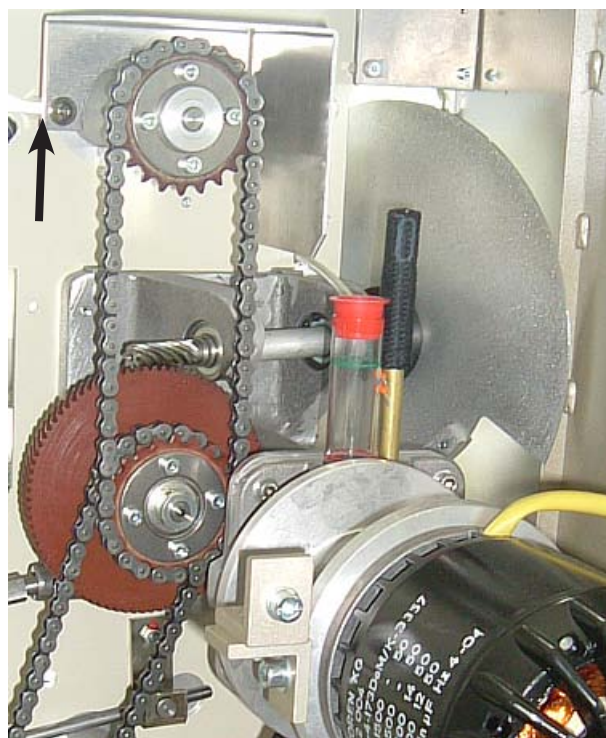
6.4.12 Tension the Chains

► **NOTE**

The chains must not be taut, but they must not flap during the movement. The chain should be tensioned in a way that a distance of about 1 cm remains, when the chain is pressed towards the bottom sprocket (arrow).



- Open the projector head rear cover.
- Remove the chain case by loosening the 2 Allen screws (arrow) and then remove the hexagonal rod nuts.



Upper Chain

- Loosen the feed sprocket assembly by turning the Allen screw from the projector front side.
- Slide the assembly vertically until the chain is tensioned correctly.
- Then fasten the Allen screw again.



Lower Chain

- Loosen the centre Allen locking screw on the eccentric gear (arrow) and move the eccentric gear until the chain tension is correct.
- Tighten the lock screw again.



7 Parts and Wearing Parts

7.1 Parts for the Film Gate

Part	Figure	Order Number
Film runner strips, white	1A	5322 463 10021
Film runner strips, Novotex brown	1B	5322 463 10023
Knurled screw for fastening the film runner strips	1C	5322 505 10336
Ceramics roller	1D	5322 532 50362
Film pressure skate, black	1E	1000 463 17019
Film pressure skate, brown (longlife)	1F	5322 463 10019

7.2 Parts for the Feed/Bottom Sprocket

Part	Figure	Order Number
Pad shoe	2A	5322 525 30003
Nut for pad shoe	2B	5322 462 50027
Spring for pad shoe	2C	5322 492 40001
Handwheel for bottom sprocket	3A	1000 413 47005

7.3 Parts for Guide Rollers

Part	Figure	Order Number
Big guide roller Ø 34 mm	4A	1000 525 37042
Cap	4B	5322 462 70374
Small guide roller Ø 20 mm	4C	1000 525 67054
Cap	4D	5322 462 70373

7.4 Other Parts

Sonstiges	Abb.	Bestellnummer
Knurled screw for shutter housing	4E	5322 505 10192
Focusing adjusting knob		1000 413 37001
Film pressure skate adjusting knob		1000 413 37001
Framing adjusting knob		5322 413 10007
Knurled screw for fastening the lens (M 4 x 8)	4F	1000 502 17004
Film cleaner		0040 060 0048X
Esso universal oil EL 4805, 100 ml		1000 390 27008
Grease for ball and slide bearings, 8 g		1000 390 27003
Pilot lamp, 24 V / 3 W		0040 120 00059
Fuse 6.3 AT		4822 253 30031

Figure 1

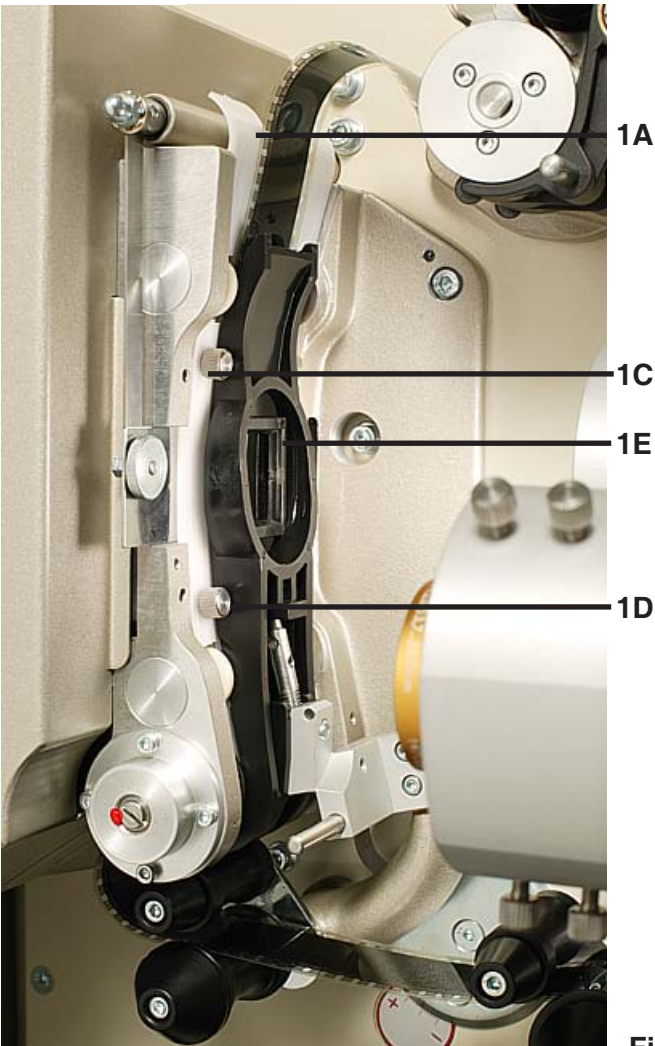


Fig. 1A



Fig. 1B



Fig. 1C



Fig. 1D



Fig. 1E



Fig. 1F



Figure 2

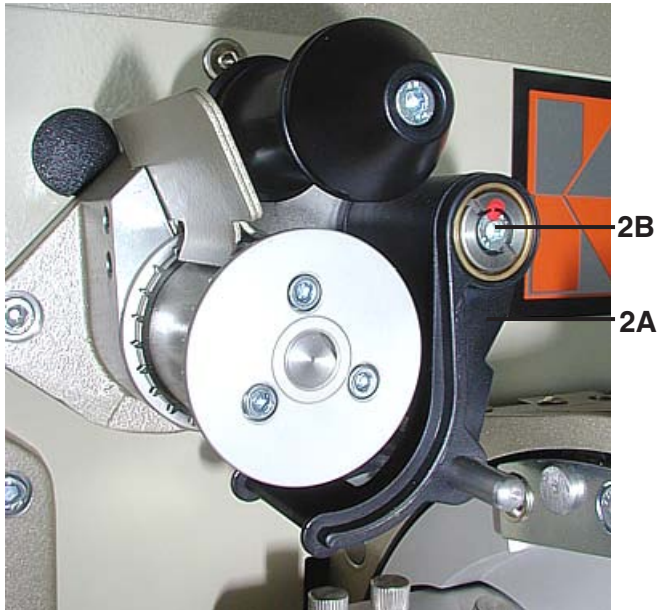


Fig. 2A



Fig. 2B



Fig. 2C



Figure 3



Fig. 3A



Figure 4

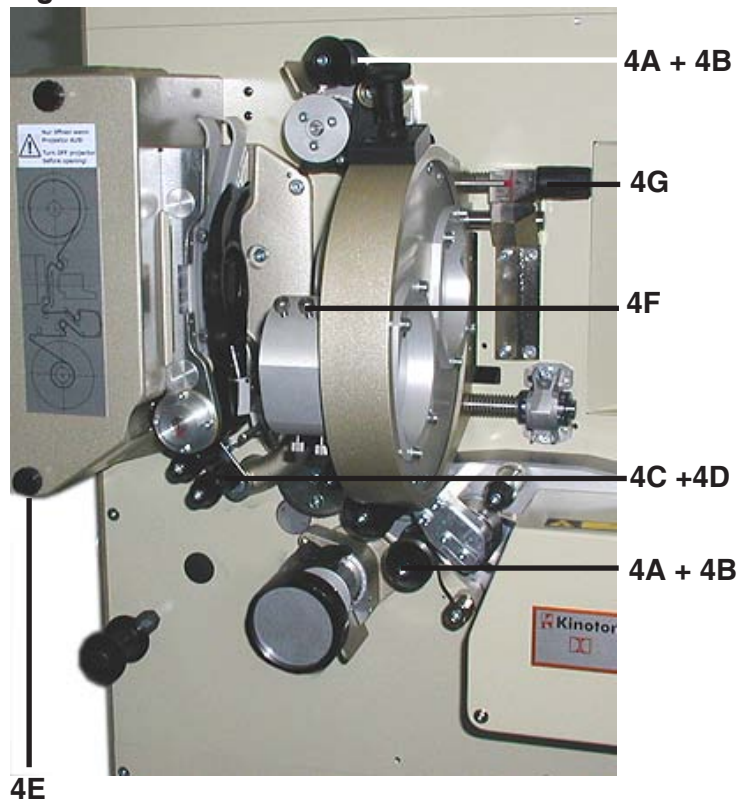


Fig. 4A



Fig. 4B



Fig. 4C



Fig. 4D



Fig. 4E



Fig. 4F



7.5 Parts for Motors and Drives

Part	Figure	Order Number
Oil hose	5	5322 530 20236
Oil gauche glass	6	5322 532 70114
Knurled nut M8	7A	1000 505 17006
Spring for Kinoton friction	7B	5322 492 50064
Felt disk for Kinoton friction	7C	1000 532 57007
Projector oil 3672/00, 1 L		1000 390 27006

Figure 5



Figure 6



Figure 7

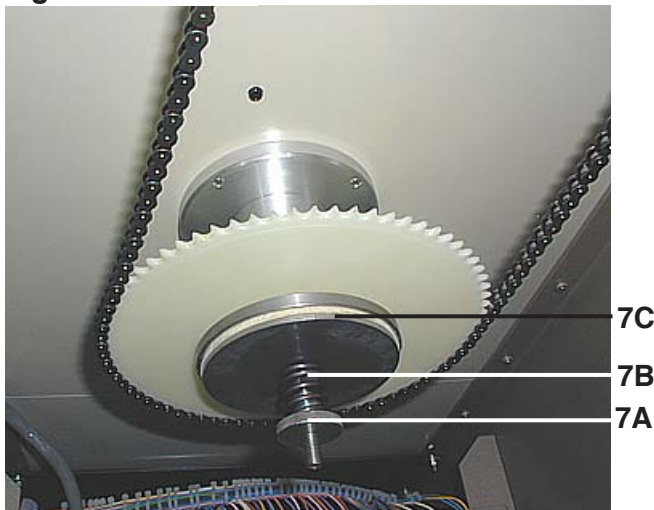


Fig. 7B



Fig. 7C



7.6 Film Spools

Part	Code number
Film spool Ø 9 mm, 600 m film	0040 060 00050
Film spool Ø 12.7 mm, 1800 m film	0040 060 00765
Film spool Ø 12.7 mm, 2000 m film	0040 060 00770

7.7 35 mm Apertures for Aperture Changer

Part	Code Number
Triple aperture shaped	1000 451 17012
Triple aperture for filing	1000 451 17016
Hole aperture to adjust the frame center	1000 451 17017
Triple aperture dimension smaller than specified	1000 451 17020
Hole aperture for filing	1000 451 17022

7.8 Single Apertures

Part	Code Number
Single aperture complete CS 2.35:1	5322 451 10009
Single aperture complete NS 1.37:1	5322 451 10011
Single aperture complete 1.85:1	5322 451 10012
Single hole aperture complete	5322 451 10013
Single aperture for silent movies	1000 451 17014
Single aperture complete Super 35 mm	1000 451 17015
Single aperture finished size 1:1.37	1000 451 17023
Single aperture finished size 1:1.66	1000 451 17024
Single aperture finished size 1:1.85	1000 451 17030
Single aperture finished size 1:2.39	1000 451 17034
Single aperture S35/1:2.39	1000 451 17029
Single aperture CS+1:1.66	1000 451 17031
Single aperture S35/1.1.85	1000 451 17032
Single aperture S35/CS	1000 451 17033

7.9 Adapter Rings for 35 mm Lenses

Part	Code Number
Adapter ring 1 for ISCO Cinemascope Ultra-Star 55 / 60	0070 410 00003
Adapter ring 2 for Schneider Super-Cinelux 50 / 52,5 / 55 / 57.5 / 60 ISCO Ultra-Star HD 42 / 45 / 48 / 50 / 55 / 60 / 65 / 70 / 75 / 80 / 85 / 90 / 95 ISCO Ultra-MC 35 / 45 / 50 / 55 / 60 / 65 / 70 / 75 / 80 / 85 / 90 ISCO Cinemascope Ultra-Star 50	0070 410 00018
Adapter ring 3 Schneider Super-Cinelux 28 / 30 / 32.5	0070 410 00015
Adapter ring 4 Schneider Super-Cinelux 42.5 / 45 / 47.5	0070 410 00017
Adapter ring 5 Schneider Super-Cinelux 35 / 37.5 / 40	0070 410 00016
Adapter ring 6 ISCO Cinemascope Ultra-Star HD 29 / 32 / 35 / 38 / 40	0070 410 00001
Adapter ring 7 ISCO Cinemascope Ultra-Star HD 95 / 100	0070 410 00002
Adapter ring 8 Schneider Super-Cinelux 2 / 90	0070 410 00019
Adapter ring 9 ISCO Ultra-Star-Plus 2.1 37.5/ 40/ 45	0070 410 00013
Adapter ring 10 ISCO Ultra-Star-CS	0070 410 00014
Adapter ring 11 Schneider Super-Cinelux 2/ 95	0070 410 00009
Adapter ring 70.6 / 62.5	0070 410 00010

8 Technical Data, Circuit Diagrams and Plans of Terminal Connections

8.1 Technical Data

8.1.1 Projector

Name	Film Projector
Type	FP 20 A
Machine No.	See data plate on housing.

Connecting Data

Power supply	120 V / 230 V
Frequency	50 Hz / 60 Hz
Pre-fuse	6.3 A
Power max.	500 W (without lamphouse)

Power and Operating Data

Nominal rotary frequency of main drive motor	1500 rpm
Power of main drive motor	100 VA

Sizes and Weights

Components	Sizes	Weight
Projector	424 mm x 750 mm x 2340 mm	approx. 180 kg
Film spools	600 m / 1800 m / 2000 m	
Friction shafts	Ø 9 mm or Ø 12.7 mm or 5/16"	
Apertures	1:1.37 / 1:1.66 / 1:2.35	
Framing	± ½ picture manual or automatic	

8.1.2 Reverse-Scan Sound Device

Connecting Data

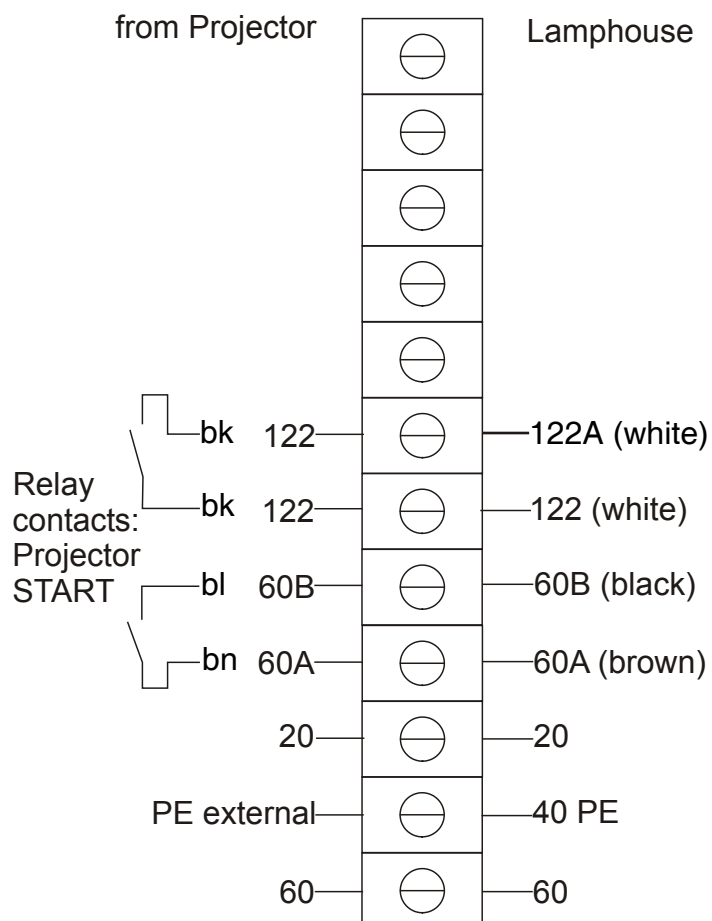
Power supply	24 V =
Frequency	50 Hz / 60 Hz
Power max.	6 W

Power and Operating Data

Frequency response	analog: 30 Hz - 16 kHz ± 1 dB digital: 20 Hz - 20 kHz ± 0.5 dB
Wow and flutter	≤ 0.1%

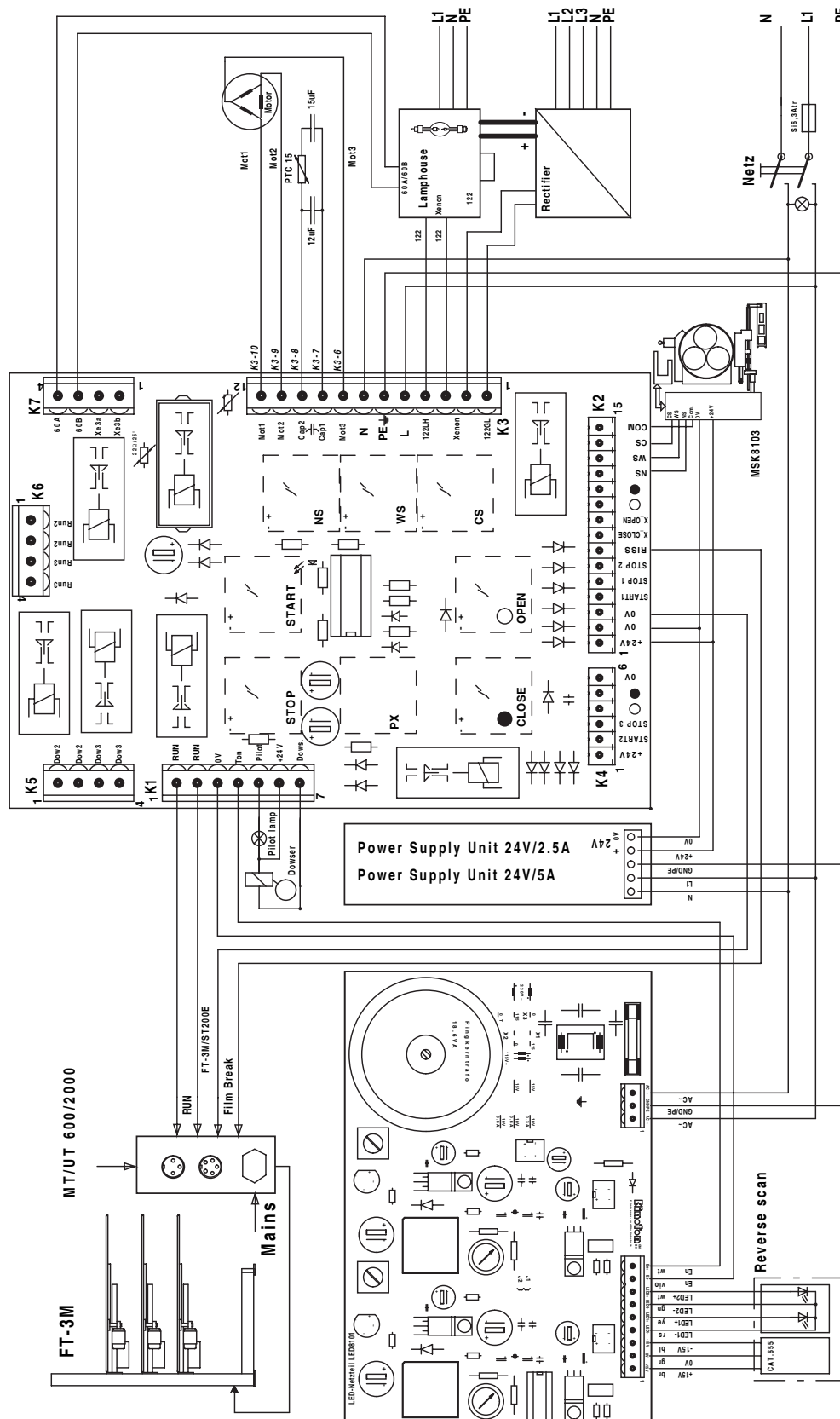
8.2 Terminal Connection: Projector / Rectifier - Lamphouse

Connect the 4-pole cable (relay contacts), the rectifier cable and the mains cable to the lamphouse terminal strip as you can see on the figure below.

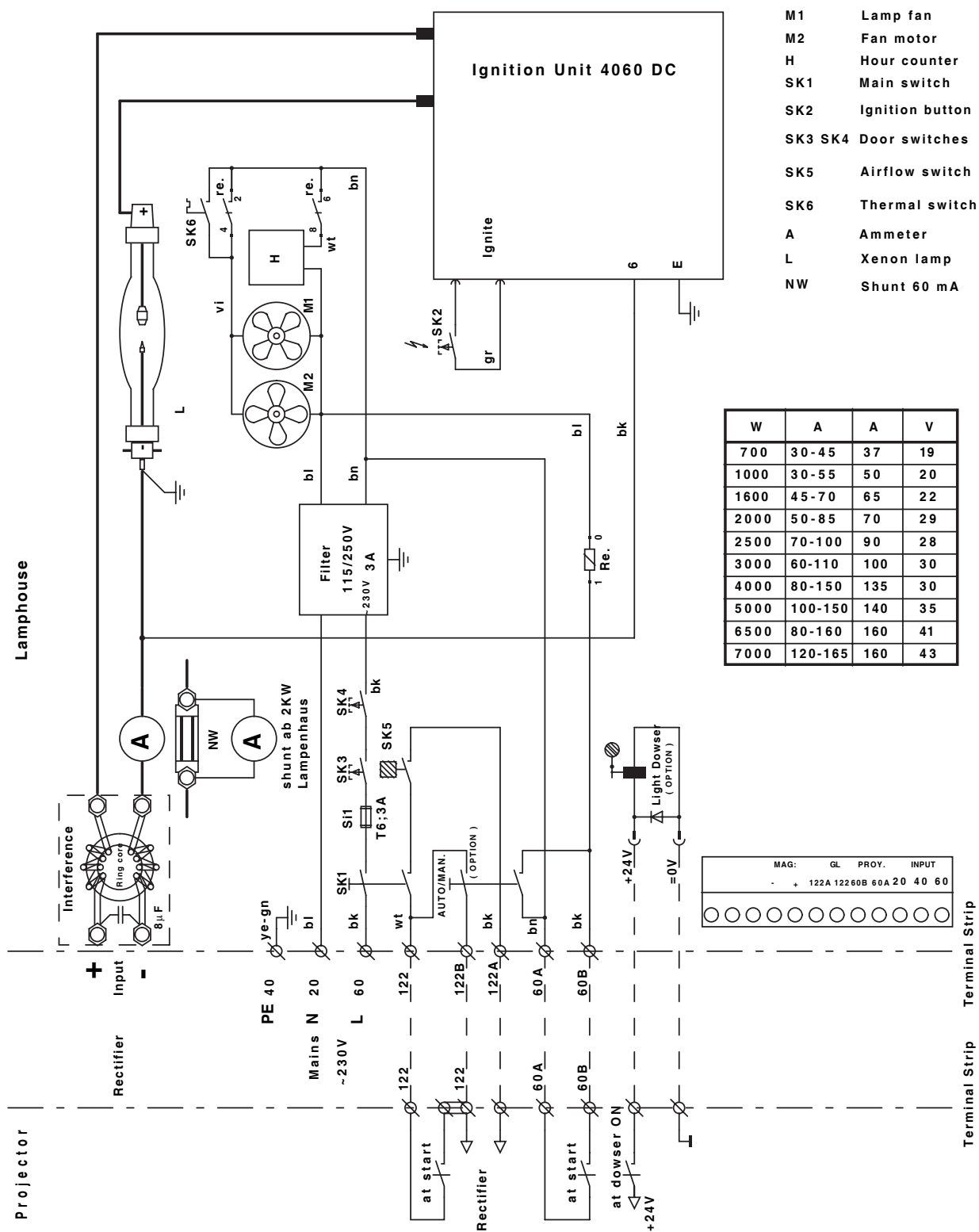


8.3 Wiring Schemes

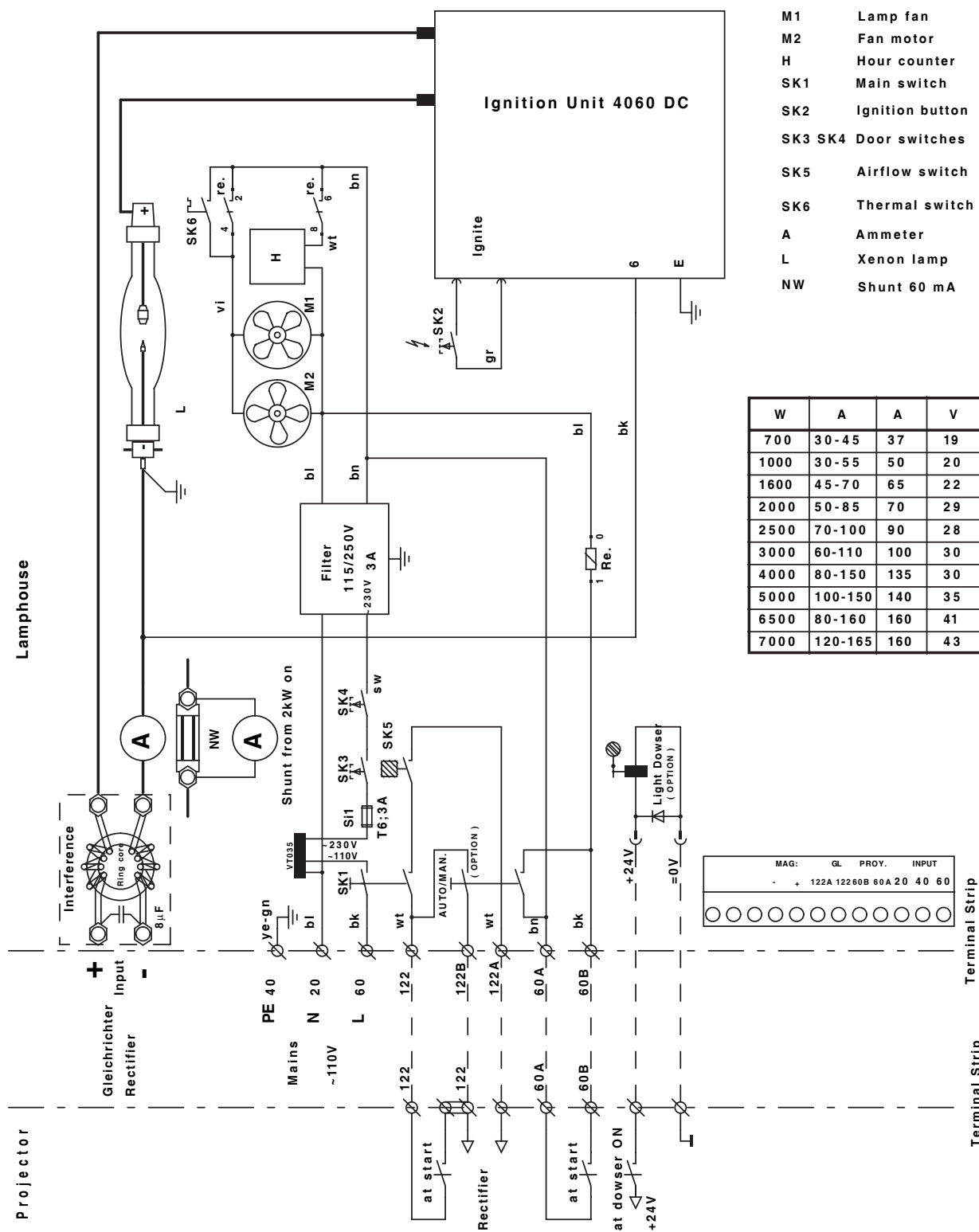
8.3.1 FP 20 A



8.3.2 Lamphouse (230 V mains connection)



8.3.3 Lamphouse (120 V mains connection)



EC Declaration of Conformity

Company name **Kinoton GmbH**
Address: **Industriestr. 20a, D-82110 Germering**
Machine designation: **Cinema Projector**
Machine type: **FP 20 A**
Maschine serial number: **KA0348**

Relevant EC stipulations:

Machine regulation **2006/42/EG**
Low Voltage regulation **2006/95/EG**
EMC regulation **2004/108/EG**

Standards:

if need be harmonized standards **EN 61000-6-1, EN 61000-6-2**
EN 55022/A1, EN 55022

if need be national standards

and technical specifications

the above-named machine is developed, constructed and manufactured in accordance with above-listed EC regulations and in sole responsibility of

Company: Kinoton GmbH
Industriestr. 20a
Germany 82110 Germering

Place, date: **Germering, 11. 01. 2010**

Signature:



Prenome, name: **Herbert Zipfel**

Function: **Production Manager**